MINERALS YEARBOOK

1959

Volume 2 of Three Volumes

FUELS

Prepared by the staff of the

BUREAU OF MINES

DIVISION OF PETROLEUM
DIVISION OF BITUMINOUS COAL
DIVISION OF ANTHRACITE

Digitized by Google

TN
23
.U582
1959
v. 2

UNITED STATES DEPARTMENT OF THE INTERIOR

FRED A. SEATON, *Secretary*

BUREAU OF MINES

MARLING J. ANKENY, *Director*

OFFICE OF THE DIRECTOR:

THOMAS H. MILLER, *Deputy Director*
PAUL ZINNER, *Assistant Director—Programs*
JAMES WESTFIELD, *Assistant Director—Health and Safety*
HENRY P. WHEELER, *Assistant Director—Helium*
PAUL T. ALLSMAN, *Chief Mining Engineer*
EARL T. HAYES, *Chief Metallurgist*
CARL C. ANDERSON, *Chief Petroleum Engineer*
LOUIS L. NEWMAN, *Chief Coal Technologist*
JOHN E. CRAWFORD, *Chief Nuclear Engineer*
WILLIAM A. VOGELY, *Chief Economist*
REXFORD C. PARMELEE, *Chief Statistician*
ALLAN SHERMAN, *Chief, Office of Mineral Reports*

DIVISIONS:

CHARLES W. MERRILL, *Chief, Division of Minerals*
T. REED SCOLLON, *Chief, Division of Bituminous Coal*
JOSEPH A. CORGAN, *Chief, Division of Anthracite*
R. A. CATTELL, *Chief, Division of Petroleum*
ELMER W. PEHRSON, *Chief, Division of Foreign Activities*
W. E. RICE, *Chief, Division of Administration*

REGIONAL OFFICES:

MARK L. WRIGHT, *Regional Director, Region I, Albany, Oreg.*
R. B. MAURER, *Regional Director, Region II, San Francisco, Calif.*
R. W. GEEHAN, *Regional Director, Region III, Denver, Colo.*
ROBERT S. SANFORD, *Acting Regional Director, Region IV, Bartlesville, Okla.*
EARLE P. SHOUB, *Regional Director, Region V, Pittsburgh, Pa.*

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1960

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price $2.50 (cloth)

Digitized by Google

DEPOSITED BY THE
UNITED STATES OF AMERICA

FOREWORD

THE THREE-VOLUME Minerals Yearbook for 1959 is being issued in this, the 50th anniversary year of the Bureau of Mines. Although the Bureau of Mines was established in 1910, the Minerals Yearbook is much older, having appeared originally in 1867 as "Reports Upon the Mineral Resources of the United States" under the seal of the Department of the Treasury. Over the years, the series has appeared variously as "Mineral Resources West of the Rocky Mountains," as part of the "Annual Report of the Geological Survey," and as "Mineral Resources of the United States." Under the last-named title, the series first appeared under Bureau of Mines authorship. That was in 1927, and the statistical coverage was for the year 1924.

In 1933, the publication assumed its new and present title of "Minerals Yearbook." Beginning with the 1952 edition, the presentation became a three-volume issue to meet the expanded and specialized needs of the mineral industries and others.

The three-volume issues of the Yearbook follow this pattern:

Volume I includes chapters on metal and nonmetal mineral commodities except mineral fuels. In addition, it includes a chapter reviewing these mineral industries, a statistical summary, chapters on mining and metallurgical technology and employment and injuries, and a new chapter on technologic trends.

Volume II includes chapters on each mineral fuel, an employment and injuries presentation, and a mineral-fuels review chapter that summarizes developments in the fuel industries.

Volume III contains chapters covering each of the 50 States, plus chapters on island possessions in the Pacific Ocean and the Commonwealth of Puerto Rico and island possessions in the Caribbean Sea, including the Canal Zone. Volume III also has a Statistical Summary chapter, identical with that in Volume I, and a chapter on employment and injuries.

The data in the Minerals Yearbook are based largely upon information supplied by mineral producers, processors, and users, and acknowledgment is made of this indispensable cooperation given by industry. Information obtained from individuals through confidential surveys has been grouped to provide statistical aggregates. Data on individual producers are presented only if available from published or other nonconfidential sources, or when permission of the individuals concerned has been granted.

MARLING J. ANKENY, *Director.*

Digitized by Google

Digitized by Google

ACKNOWLEDGMENTS

The chapters in this volume of the Minerals Yearbook were prepared by the staffs of several Bureau divisions. Those dealing with bituminous coal and its products were prepared under the general supervision of T. Reed Scollon, chief, Division of Bituminous Coal, and T. W. Hunter, chief, Branch of Bituminous-Coal Economics and Statistics; the chapters on petroleum and related commodities were prepared under the general supervision of R. A. Cattell, chief, Division of Petroleum, and D. S. Colby, chief, Branch of Petroleum Economics; the anthracite chapter was prepared under the general direction of Joseph A. Corgan, chief, Division of Anthracite; the helium chapter was prepared under the direction of Henry P. Wheeler, Jr., Assistant Director—Helium, and data for the Pacific coast were compiled under the direction of J. B. Mull, Region II. Preparation of this volume was coordinated by Virgil L. Barr, Executive Assistant to the Chief, Division of Petroleum, and Thelma Stewart, editorial assistant.

Because of the many sources of data presented, the Bureau cannot credit each source individually, but acknowledgment is made of the splendid cooperation of producers and users of fuels who supplied information and of the business press, trade associations, scientific journals, international organizations, and State and Federal agencies. The Bureau of the Census, U.S. Department of Commerce, furnished data on foreign trade, and the U.S. Foreign Service, Department of State, provided information on foreign production and developments.

The mining and geology and related departments of the respective States have been most cooperative and have made available supplementary and verifying information regarding production and plant operations. For their assistance the Bureau is deeply grateful, and acknowledgment is made to the following State organizations that assisted with the canvasses of bituminous coal and lignite:

Alabama: Division of Safety and Inspection, Birmingham.
Alaska: Department of Natural Resources, Division of Mines and Minerals, Juneau.
Arizona: State mine inspector, Phoenix.
Arkansas: State mine inspector, Fort Smith.
Colorado: Colorado Coal Mine Inspection Department, Denver.
Georgia: Department of Mines, Mining, and Geology, State Division of Conservation, Atlanta.
Illinois: State Department of Mines and Minerals, Springfield.
Indiana: Bureau of Mines, Terre Haute.
Iowa: State mine inspectors, Des Moines.
Kansas: State Mine Inspection Division, Pittsburg.
Kentucky: Kentucky Department of Mines and Minerals, Lexington.
Maryland: Maryland Bureau of Mines, Westernport.
Missouri: Division of Mine Inspection, Jefferson City.
New Mexico: State inspector of mines, Albuquerque.

Digitized by Google

North Dakota: State coal-mine inspector, Bismarck.
Ohio: Division of Mines and Mining, Ohio Department of Industrial Relations, Columbus.
Oklahoma: Chief mine inspector, Oklahoma City.
Pennsylvania: Pennsylvania Department of Mines and Mineral Industries, Harrisburg.
Tennessee: Tennessee Division of Mines, Knoxville.
Utah: Safety Division, Industrial Commission of Utah, Salt Lake City.
Virginia: Division of Mines, Virginia Department of Labor and Industry, Big Stone Gap.
Washington: Chief coal-mine inspector, Department of Labor and Industries, Seattle.
West Virginia: West Virginia Department of Mines, Charleston.
Wyoming: State coal-mine inspector, Rock Springs.

Appreciation is also expressed to the Commonwealth of Pennsylvania Department of Mines and Mineral Industries, Harrisburg, and Commonwealth of Massachusetts, Division on Necessaries of Life, Boston, for assistance in acquiring data on anthracite and to the following for their assistance with the peat canvass:

Michigan: Department of Conservation, Lansing.
New Jersey: Department of Conservation and Economic Development, Bureau of Geology and Topography, Trenton.
Washington: Department of Conservation and Development, Olympia.

Credit is also due the following State organizations that assisted with the petroleum and natural-gas canvasses:

Arkansas: Arkansas Oil and Gas Commission, El Dorado. Department of Revenue, Little Rock.
California: California Department of Natural Resources, San Francisco. Public Utilities Commission, State of California, San Francisco.
Illinois: Oil and Gas Division and State Geological Survey Division, Urbana.
Kansas: Conservation Division, State Corporation Commission, Wichita. State Geological Survey, University of Kansas, Lawrence.
Louisiana: Louisana Department of Conservation, Baton Rouge.
Maryland: Department of Geology, Mines, and Water Resources, Baltimore.
Michigan: Geological Survey Division, Department of Conservation, Lansing.
Mississippi: Mississippi State Oil and Gas Board, Jackson. Oil and Gas Severance Tax Division, Mississippi State Tax Commission, Jackson.
Missouri: Division of Geological Survey and Water Resources, Department of Business and Administration, Rolla. Geological Survey and Water Resources, Rolla.
New York: New York State Science Service, Albany.
North Dakota: North Dakota, Geological Survey, Grand Forks.
Ohio: Oil and Gas Section, Department of Natural Resources, Columbus.
Oklahoma: Oil and Gas Conservation Department, Oklahoma Corporation Commission, Oklahoma City. Gross Production Tax Department, Oklahoma Tax Commission, Oklahoma City.
Tennessee: Division of Geology, Department of Conservation, Nashville.
Texas: Oil and Gas Division, Railroad Commission of Texas, Austin. Oil and Gas Division, State Comptroller of Public Accounts, Austin.
Virginia: Geological Survey Division, Department of Conservation and Development, Charlottesville.
West Virginia: Geological and Economic Survey, Morgantown.

Grateful acknowledgment is made to the American Iron and Steel Institute, New York, N.Y.; the Anthracite Institute, Wilkes-Barre, Pa.; the Association of American Railroads, Washington, D.C.; the Upper Lake Docks Coal Bureau, Inc., St. Paul, Minn.; the Ore and Coal Exchange, Cleveland Ohio; the National Association of Packaged Fuel Manufacturers, Topeka, Kans.; and the many other trade and industry associations that have provided data.

Digitized by Google

CONTENTS

	Page
Foreword, by Marling J. Ankeny	III
Acknowledgments	V
Part I. General Reviews:	
Review of the mineral-fuel industries in 1959, by Victor Erickson and T. W. Hunter	1
Employment and injuries in the fuel industries, by John C. Machisak	33
Part II. Commodity Reviews:	
A. Coal and related products:	
Coal—bituminous and lignite, by W. H. Young, R. L. Anderson, and E. M. Hall	39
Coal—Pennsylvania anthracite, by Forrest T. Moyer, J. A. Vaughan, and Marian I. Cooke	135
Coke and coal chemicals, by J. A. DeCarlo, T. W. Hunter, and Maxine M. Otero	187
Fuel briquets and packaged fuel, by Eugene T. Sheridan and Virginia C. Berté	249
Peat, by Eugene T. Sheridan and Virginia C. Berté	265
B. Petroleum and related products:	
Carbon black, by Ivan F. Avery and Lulie V. Harvey	283
Natural Gas, by Ivan F. Avery and Lulie V. Harvey	295
Natural-gas liquids, by I. F. Avery, W. G. Messner, B. D. Furgang, and E. R. Eliff	315
Crude petroleum and petroleum products, by James G. Kirby, Walter G. Messner, and Betty M. Moore	337
C. Helium:	
Helium, by Harold W. Lipper	471
Part III. Appendix:	
Tables of measurement	477
Index	479

Digitized by Google

Digitized by Google

PART I. GENERAL REVIEWS

Review of the Mineral-Fuel Industries in 1959

by Victor Erickson [1] and T. W. Hunter [2]

Contents

	Page		Page
General summary	1	Income and investment	20
Domestic production	1	Transportation	22
Consumption	10	Distribution of bituminous coal and lignite	24
Stocks	11	World review	28
Labor and productivity	11	Government activities	32
Prices and costs	13		

GENERAL SUMMARY

ECONOMIC recovery, which began in 1958, carried through into 1959 but was somewhat retarded by the 116-day steel strike beginning in July 1959. Recovery and economic growth increased production and consumption of mineral fuels 3 percent above 1958. The increase was accomplished despite a drop of 26 percent in coal exports. Prices remained constant during the year so that the value of production and consumption also increased 3 percent over 1958. Stocks in the hands of producers at yearend were little changed from the supply at the beginning of the year.

Employment in the field of mineral fuels decreased 6.4 percent from 1958. Average hourly earnings were up 7 percent, and average hours worked were up 5 percent, with the result that weekly earnings gained 11.8 percent. Internal freight rates were relatively constant, but ocean tanker rates declined both in 1958 and 1959 from the high rates charged during the Suez crisis. The index of major input expenses decreased for anthracite, held constant for bituminous coal, and increased for petroleum. The index of labor cost per dollar of product and per ton of product declined again in 1959 to a new low in anthracite and bituminous-coal mining industries.

DOMESTIC PRODUCTION

Changes in the domestic production of fuels and energy may be measured in several ways. Table 1 summarizes the total energy production from mineral fuels and waterpower in the United States in terms of British thermal unit (B.t.u.) content of the various sources (see also figs. 1 and 2). The values of mineral-fuel production are summarized in table 2; and the actual physical volume of production, in the usual physical units used for each commodity, with values, are

[1] Fiscal and financial economist.
[2] Chief, Branch of Bituminous Coal Economics.

Digitized by Google

given in table 3. Finally, indexes of physical volume of production, weighted by values, are listed in tables 4 and 5. Since these measures are directed to different aspects of the fuels industries, it is not surprising that these measures sometimes move disparately. Such was the case in 1959. Total energy production, measured in British thermal units, was 3 percent higher than in 1958. Actual physical quantities (B.t.u.) of production showed three increases and two decreases. The value of mineral-fuel production increased by $364 million, a 3-percent increase. The Bureau of Mines index of physical volume of mineral-fuel production increased by 3.8 (a 3.4-percent rise); the Federal Reserve Board (FRB) Index increased 4 points.

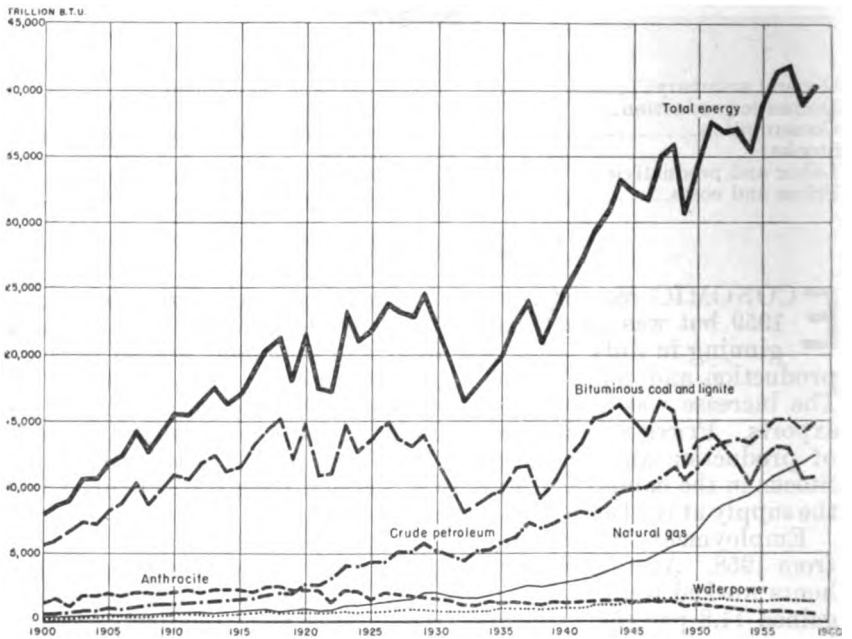

FIGURE 1.—Production of mineral-energy fuels and energy from waterpower in continental United States 1900–59.

Total Energy.—Total production of mineral-energy fuels and energy from waterpower in the United States in 1959 increased to 40,389 trillion B.t.u. As indicated in table 1 and figure 1, all fuels increased except anthracite; energy from waterpower decreased very slightly. Bituminous coal and lignite increased 0.4 percent, crude petroleum increased 5.1 percent, natural gas increased 4.2 percent, and anthracite declined 2.6 percent.

Value of Production.—Mineral-fuel production value increased by 3 percent in 1959, largely owing to increases in physical quantity of production.

Domestic Production.—Production of the important mineral fuels increased in 1959. Production increases occurred in bituminous limestone and sandstone, gilsonite, bituminous and lignite, helium, natural

Digitized by Google

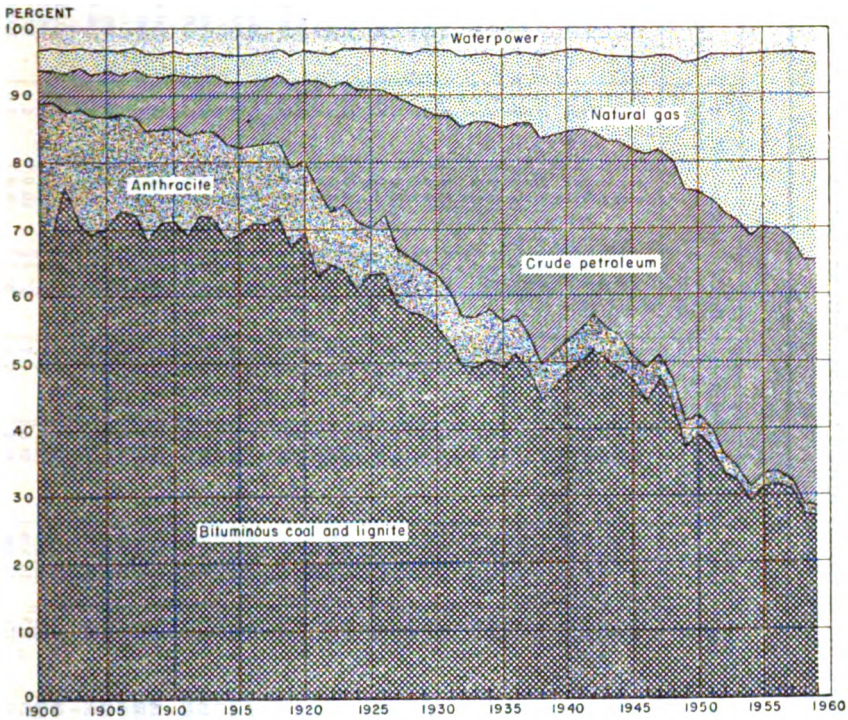

FIGURE 2.—Percentage of total production of British thermal units equivalent of mineral-energy fuels and energy from waterpower in continental United States, 1900–59.

gas, and natural-gas liquids, including LP-gases, peat, and crude petroleum. Except for a decrease in the relatively minor item carbon dioxide (natural), the only decrease was in anthracite.

Indexes of Physical Production.—The Bureau of Mines index of the physical volume of mineral production in the United States is comprehensive and one that uses shifting weights to reflect the changing patterns of production and consumption as the economy grows and changes. The index for the fuels group for the years 1880–1958 is published in the Minerals Yearbook, 1958, volume II, pages 9–10, and for all other group for the years 1880–1956 in Minerals Yearbook, 1956, volume I, pages 2–5. Table 4 shows the index for the period since 1940, including the 1959 recovery in the hydrocarbon segment of fuels production from the recession of 1958. The coal segment however failed to make a significant recovery and, in fact, declined slightly.

The FRB indexes of production, which are available monthly, exhibit behavior parallel with the Bureau of Mines index. FRB indexes, adjusted seasonally, indicate that the recovery beginning in 1958 carried through the first half of 1959. However, in July the FRB index of total industrial production began to fall, probably as a result of the steel strike. Simultaneously the production of coal fell, but even more precipitously. These trends were reversed in Novem-

Digitized by Google

TABLE 1.—Production of mineral energy fuels and energy from waterpower in trillion British thermal units and percentage contributed by each in continental United States[1]

	Bituminous coal and lignite			Anthracite	Crude petroleum	Natural gas, wet	Water-power	Grand total	Percentage					
	Continental United States	Alaska	Total United States						Bituminous coal and lignite	Anthracite	Crude petroleum	Natural gas, wet	Water-power	Total
1900	5,563	----------	5,563	1,457	369	254	250	7,893	70.5	18.4	4.7	3.2	3.2	100.0
1901	5,917	----------	5,917	1,714	402	283	264	8,580	68.9	20.0	4.7	3.3	3.1	100.0
1902	6,818	----------	6,818	1,051	515	301	289	8,974	76.0	11.7	5.7	3.4	3.2	100.0
1903	7,408	----------	7,408	1,895	583	319	321	10,526	70.4	18.0	5.5	3.0	3.1	100.0
1904	7,301	----------	7,301	1,858	679	333	354	10,525	69.4	17.6	6.4	3.2	3.4	100.0
1905	8,255	----------	8,255	1,973	781	377	386	11,772	70.1	16.8	6.6	3.2	3.3	100.0
1906	8,983	----------	8,983	1,811	734	418	414	12,360	72.7	14.7	5.9	3.4	3.3	100.0
1907	10,343	----------	10,343	2,174	963	437	441	14,358	72.0	15.1	6.7	3.1	3.1	100.0
1908	8,713	----------	8,713	2,115	1,035	432	476	12,771	68.2	16.6	8.1	3.4	3.7	100.0
1909	9,949	----------	9,949	2,059	1,062	517	513	14,100	70.6	14.6	7.5	3.7	3.6	100.0
1910	10,928	----------	10,928	2,146	1,215	547	539	15,375	71.1	14.0	7.9	3.5	3.5	100.0
1911	10,635	----------	10,635	2,298	1,279	551	565	15,328	69.4	15.0	8.3	3.6	3.7	100.0
1912	11,793	----------	11,793	2,143	1,293	604	585	16,418	71.8	13.0	7.9	3.7	3.6	100.0
1913	12,535	----------	12,535	2,325	1,441	626	609	17,536	71.5	13.2	8.2	3.6	3.5	100.0
1914	11,075	----------	11,075	2,307	1,541	636	636	16,195	68.4	14.3	9.5	3.9	3.9	100.0
1915	11,597	----------	11,597	2,260	1,630	676	659	16,822	69.0	13.4	9.7	4.0	3.9	100.0
1916	13,166	----------	13,166	2,224	1,744	810	681	18,625	70.7	11.9	9.4	4.3	3.7	100.0
1917	14,456	1	14,457	2,530	1,945	855	700	20,487	70.6	12.3	9.5	4.2	3.4	100.0
1918	15,178	2	15,180	2,510	2,064	775	701	21,230	71.5	11.8	9.7	3.7	3.3	100.0
1919	12,204	2	12,206	2,238	2,195	802	718	18,159	67.2	12.3	12.1	4.4	4.0	100.0
1920	14,897	2	14,899	2,276	2,569	883	738	21,365	69.7	10.7	12.0	4.1	3.5	100.0
1921	10,895	2	10,897	2,298	2,739	732	620	17,286	63.0	13.3	15.9	4.2	3.6	100.0
1922	11,061	2	11,063	1,389	3,234	843	643	17,172	64.5	8.1	18.8	4.9	3.7	100.0
1923	14,788	4	14,792	2,371	4,248	1,113	685	23,209	63.7	10.2	18.3	4.8	3.0	100.0
1924	12,670	2	12,672	2,233	4,141	1,203	648	20,957	60.5	10.6	19.8	6.0	3.1	100.0
1925	13,623	2	13,625	1,570	4,430	1,314	668	21,607	63.1	7.2	20.5	6.1	3.1	100.0
1926	15,019	1	15,020	2,145	4,471	1,452	728	23,816	63.1	9.0	18.8	6.1	3.0	100.0
1927	13,563	2	13,565	2,034	5,227	1,598	776	23,200	58.5	8.8	22.5	6.9	3.3	100.0
1928	13,116	4	13,120	1,914	5,229	1,734	854	22,851	57.4	8.4	22.9	7.6	3.7	100.0
1929	14,014	3	14,017	1,875	5,842	2,118	816	24,668	56.8	7.6	23.7	8.6	3.3	100.0
1930	12,246	3	12,249	1,762	5,208	2,148	752	22,119	55.4	8.0	23.5	9.7	3.4	100.0
1931	10,008	3	10,011	1,515	4,936	1,869	668	18,999	52.7	8.0	26.0	9.8	3.5	100.0
1932	8,112	2	8,114	1,266	4,554	1,729	713	16,376	49.5	7.7	27.8	10.6	4.4	100.0
1933	8,739	2	8,741	1,258	5,253	1,733	711	17,696	49.4	7.1	29.7	9.8	4.0	100.0

Digitized by Google

1934	9,413	2	9,415	1,452	5,267	1,970	698	18,802	50.1	7.7	28.0	10.5	3.7	100.0
1935	9,753	3	9,756	1,325	5,780	2,136	806	19,803	49.2	6.7	29.2	10.8	4.1	100.0
1936	11,501	3	11,504	1,380	6,378	2,411	812	22,491	51.2	6.1	28.4	10.7	3.6	100.0
1937	11,669	4	11,673	1,317	7,419	2,084	871	23,964	48.7	5.5	31.0	11.2	3.6	100.0
1938	9,128	4	9,132	1,171	7,043	2,565	866	20,777	44.0	5.6	33.9	12.3	4.2	100.0
1939	10,341	4	10,345	1,308	7,337	2,763	838	22,591	45.8	5.8	32.5	12.2	3.7	100.0
1940	12,068	4	12,072	1,308	7,849	2,979	880	25,088	48.1	5.2	31.3	11.9	3.5	100.0
1941	13,464	7	13,471	1,432	8,133	3,162	934	27,132	49.6	5.3	30.0	11.7	3.4	100.0
1942	15,260	7	15,267	1,532	8,043	3,436	1,136	29,414	51.9	5.2	27.3	11.7	3.9	100.0
1943	15,455	8	15,463	1,540	8,733	3,839	1,304	30,879	50.1	5.0	28.3	12.4	4.2	100.0
1944	16,224	9	16,233	1,618	9,732	4,176	1,344	33,103	49.0	4.9	29.4	12.6	4.1	100.0
1945	15,126	8	15,134	1,395	9,939	4,423	1,442	32,333	46.8	4.3	30.7	13.7	4.5	100.0
1946	13,979	10	13,989	1,537	10,057	4,550	1,406	31,539	44.3	4.9	31.9	14.4	4.5	100.0
1947	16,513	9	16,522	1,453	10,771	5,012	1,426	35,184	47.0	4.1	30.6	14.2	4.1	100.0
1948	15,697	10	15,707	1,451	11,717	5,615	1,481	35,971	43.7	4.0	32.6	15.6	4.1	100.0
1949	11,461	11	11,472	1,085	10,683	5,911	1,539	30,690	37.4	3.5	34.8	19.3	5.0	100.0
1950	13,517	10	13,527	1,120	11,449	6,841	1,573	34,510	39.2	3.2	33.2	19.8	4.6	100.0
1951	13,969	13	13,982	1,084	13,037	8,106	1,559	37,768	37.0	2.9	34.5	21.5	4.1	100.0
1952	12,213	18	12,231	1,031	13,282	8,705	1,581	36,830	33.2	2.8	36.1	23.6	4.3	100.0
1953	11,958	23	11,981	786	13,671	9,116	1,522	37,076	32.3	2.1	36.9	24.6	4.1	100.0
1954	10,245	17	10,262	739	13,427	9,488	1,449	35,365	29.0	2.1	38.0	26.8	4.1	100.0
1955	12,157	17	12,174	665	14,410	10,204	1,447	38,900	31.3	1.7	37.1	26.2	3.7	100.0
1956	13,104	19	13,123	734	15,181	10,930	1,542	41,510	31.6	1.8	36.6	26.3	3.7	100.0
1957	12,887	22	12,909	644	15,178	11,571	1,524	41,826	30.9	1.5	36.3	27.7	3.6	100.0
1958	10,734	20	10,754	538	14,204	11,943	1,693	39,132	27.5	1.4	36.3	30.5	4.3	100.0
1959	10,778	17	10,795	524	[2] 14,933	[2] 12,446	[2] 1,691	[2] 40,389	[2] 26.7	[2] 1.3	[2] 37.0	[2] 30.8	[2] 4.2	100.0

[1] The unit heat values employed are: Anthracite, 12,700 B.t.u. per pound; bituminous coal and lignite, 13,100 B.t.u. per pound; petroleum, 5,800,000 B.t.u. per barrel; natural gas, total production×1,075 B.t.u. minus repressuring vent and waste gas×1,035. Waterpower includes installations owned by manufacturing plants and mines, as well as Government and privately owned public utilities. The fuel equivalent of waterpower is calculated from the kilowatt hours of power produced wherever available, as it is true of all public-utility plants since 1919. Otherwise, the fuel equivalent is calculated from the reported horsepower of installed water wheels, assuming a capacity factor of 20 percent for factories and mines and 40 percent for public utilities.

[2] Preliminary.

Digitized by Google

TABLE 2.—Value of mineral production in United States by mineral groups [1]

(Millions of dollars)

Mineral groups	1950-54 (average)	1955	1956	1957	1958	1959	Change in 1959 from 1958 (percent)
Metals and nonmetals except fuels:							
Nonmetals	2,209	2,957	3,266	3,267	3,346	3,720	+11
Metals	1,594	2,055	2,358	2,137	1,593	1,570	−1
Total	3,803	5,012	5,624	5,404	4,939	5,290	+7
Mineral fuels	9,652	10,780	11,741	12,709	11,589	11,953	+3
Grand total	13,455	15,792	17,365	18,113	16,528	17,243	+4

[1] Beginning with 1953, Alaska and Hawaii are included.

TABLE 3.—Mineral-fuels production in the United States [1]

Mineral	1956		1957	
	Short tons (unless otherwise stated)	Value (thousands)	Short tons (unless otherwise stated)	Value (thousands)
Asphalt and related bitumens (native):				
Bituminous limestone and sandstone	1,458,533	$4,114	1,168,507	$3,221
Gilsonite	89,003	3,822	207,704	4,259
Carbon dioxide, natural (estimated) thousand cubic feet	713,030	235	704,276	139
Coal:				
Bituminous and lignite [2] thousand short tons	500,874	2,412,004	492,704	2,504,406
Pennsylvania anthracite do	28,900	236,785	25,338	227,754
Helium thousand cubic feet	266,937	4,413	310,365	5,112
Natural gas million cubic feet	10,081,923	1,083,812	10,680,258	1,201,759
Natural-gas liquids:				
Natural gasoline and cycle products thousand gallons	5,807,100	431,958	5,734,307	415,791
LP-gases do	6,487,413	265,185	6,655,282	263,665
Peat	272,972	2,320	316,217	3,458
Petroleum (crude) thousand 42-gallon barrels	2,617,283	7,296,760	2,616,901	8,079,259
Total mineral fuels		11,741,000		12,709,000
Total all other minerals		5,624,000		5,404,000
Grand total, mineral production		17,365,000		18,113,000

Mineral	1958		1959	
	Short tons (unless otherwise stated)	Value (thousands)	Short tons (unless otherwise stated)	Value (thousands)
Asphalt and related bitumens (native):				
Bituminous limestone and sandstone	1,326,493	$3,343	[3] 1,518,765	$3,868
Gilsonite	317,280	4,864	[3] 379,362	9,385
Carbon dioxide, natural (estimated) thousand cubic feet	722,615	102	484,074	71
Coal:				
Bituminous and lignite [2] thousand short tons	410,446	1,996,281	412,028	1,965,607
Pennsylvania anthracite do	21,171	187,898	20,649	172,320
Helium thousand cubic feet	352,134	5,741	375,408	6,144
Natural gas million cubic feet	11,030,298	1,317,492	[3] 12,046,115	[3] 1,556,800
Natural-gas liquids:				
Natural gasoline and cycle products thousand gallons	5,596,458	393,139	5,597,102	408,694
LP-gases do	6,783,000	296,571	7,874,706	349,802
Peat	327,813	3,446	419,460	4,372
Petroleum (crude) thousand 42-gallon barrels	[4] 2,449,016	[4] 7,380,065	2,574,590	7,476,369
Total mineral fuels		11,589,000		11,953,432
Total all other minerals		4,939,000		5,290,000
Grand total, mineral production		16,528,000		17,243,432

[1] Includes Alaska and Hawaii.
[2] Includes small quantity of anthracite mined in States other than Pennsylvania.
[3] Preliminary figure.
[4] Revised figure.

Digitized by Google

ber and December. Crude-oil and natural-gas indexes were affected much less by the slowdown associated with the steel strike.

TABLE 4.—Indexes of the physical volume of mineral production in the United States, 1940–59, by groups and subgroups [1]

(1947–49=100)

	All minerals	Fuels			Metals	Nonmetals
		Total	Coal	Hydrocarbons [2]		
1940	78.4	75.6	84.6	70.1	110.0	66.2
1941	86.1	80.5	94.1	72.6	124.8	81.3
1942	90.8	84.2	105.5	72.3	135.3	86.2
1943	92.5	88.9	106.9	78.3	136.4	75.9
1944	95.4	96.3	112.5	86.8	117.7	69.9
1945	92.0	94.8	103.7	89.3	95.2	70.2
1946	91.0	93.5	98.7	90.4	78.9	83.6
1947	101.9	102.8	112.8	96.8	101.6	95.6
1948	105.9	106.5	108.0	105.5	104.4	103.4
1949	92.1	90.7	79.2	97.6	94.1	101.0
1950	102.6	100.1	91.7	105.1	108.8	116.1
1951	112.6	110.1	93.6	119.9	117.2	127.3
1952	110.9	107.8	82.7	122.8	112.7	132.1
1953	112.6	108.8	78.8	126.6	119.1	135.2
1954	107.9	104.0	68.1	125.4	97.6	146.4
1955	119.0	113.8	78.7	134.6	115.0	161.0
1956	125.8	120.5	85.0	141.7	117.1	[3] 172.6
1957	126.1	120.3	82.9	142.5	118.8	175.7
1958	115.5	110.2	69.0	134.7	90.8	176.2
1959 [4]	119.2	114.0	68.8	141.0	82.2	190.7

[1] For general description of index, see Minerals Yearbook 1956, vol. I, Review of the Mineral Industries, pp. 2–5. Indexes for components of the fuels index go back to 1880 (the initial year of the overall index) in Minerals Yearbook 1958, vol. II, pp. 9–10.
[2] Does not cover isopentane, LP-gases, and other natural-gas liquids.
[3] Revised figure.
[4] Preliminary figures.

TABLE 5.—Indexes of industrial production, mineral fuels, seasonally adjusted [1]

(1957=100)

	Total mineral fuels	Coal	Crude oil and natural gas	Total industrial production
1955	96	97	95	96
1956	99	103	100	99
1957	100	100	100	100
1958	92	83	94	93
1959	96	82	99	105
January	96	89	98	100
February	95	87	96	102
March	94	82	97	104
April	96	84	99	107
May	98	89	100	109
June	97	83	100	110
July	94	71	99	108
August	93	72	98	104
September	94	74	98	103
October	94	76	99	102
November	97	87	100	103
December	99	94	100	109

[1] Federal Reserve Bulletin, January and June 1960; and Selected Advance Work Tables of Revised Monthly Industrial Production Indexes for Industry Groupings, 1957=100, April 1960.

Digitized by Google

TABLE 6.—Calculated consumption of energy fuels and energy from waterpower in trillion British thermal units and percentage contributed by each in continental United States[1]

	Bituminous coal and lignite	Anthracite	Crude oil	Petroleum products net: E, exported; I, imported	Natural gas, dry	Natural-gas liquids	Waterpower	Grand total	Percentage							
									Bituminous coal and lignite	Anthracite	Crude oil	Petroleum products net: E, exported; I, imported	Natural gas, dry	Natural-gas liquids	Waterpower	Total
1920	13,325	2,179	3,027	E 393	827	42	775	19,782	67.4	11.0	15.3	E 2.0	4.2	0.2	3.9	100.0
1921	10,266	2,082	3,016	E 342	682	50	656	16,410	62.6	12.7	18.4	E 2.1	4.1	.3	4.0	100.0
1922	11,185	1,443	3,390	E 319	785	56	675	17,215	65.0	8.4	19.7	E 1.9	4.6	.3	3.9	100.0
1923	13,598	2,208	4,419	E 389	1,032	90	727	21,685	62.7	10.2	20.4	E 1.8	4.8	.4	3.3	100.0
1924	12,681	2,050	4,228	E 464	1,170	103	685	20,453	62.0	10.0	20.7	E 2.3	5.7	.5	3.4	100.0
1925	13,079	1,627	4,641	E 485	1,212	124	701	20,899	62.6	7.8	22.2	E 2.3	5.8	.6	3.3	100.0
1926	13,954	1,961	4,876	E 545	1,335	149	765	22,495	62.0	8.7	21.7	E 2.4	5.9	.7	3.4	100.0
1927	13,095	1,897	5,027	E 650	1,465	179	815	21,828	60.0	8.7	23.0	E 3.0	6.7	.8	3.8	100.0
1928	13,069	1,871	5,474	E 711	1,588	200	890	22,381	58.4	8.4	24.4	E 3.2	7.1	.9	4.0	100.0
1929	13,612	1,815	5,894	E 600	1,942	246	847	23,756	57.3	7.6	24.8	E 2.5	8.2	1.0	3.6	100.0
1930	11,921	1,718	6,148	E 496	2,969	243	785	22,288	53.5	7.7	27.6	E 2.2	8.8	1.1	3.5	100.0
1931	9,743	1,484	5,304	E 339	1,715	200	692	18,799	51.8	7.9	28.2	E 1.8	9.1	1.1	3.7	100.0
1932	8,041	1,283	4,830	E 240	1,594	158	726	16,392	49.1	7.8	29.5	E 1.5	9.7	1.0	4.4	100.0
1933	8,323	1,260	5,143	E 299	1,600	144	729	16,900	49.2	7.5	30.4	E 1.8	9.5	.9	4.3	100.0
1934	9,008	1,410	5,136	E 318	1,819	161	721	17,937	50.2	7.9	28.6	E 1.8	10.2	.9	4.0	100.0
1935	9,336	1,298	5,799	E 300	1,974	169	831	19,107	48.9	6.8	30.4	E 1.6	10.3	.9	4.3	100.0
1936	10,697	1,351	6,426	E 302	2,221	184	841	21,418	49.9	6.3	30.0	E 1.4	10.4	.9	3.9	100.0
1937	11,286	1,280	7,004	E 400	2,468	208	905	22,751	49.6	5.6	30.8	E 1.7	10.8	.9	4.0	100.0
1938	8,811	1,148	6,921	E 456	2,348	209	899	19,880	44.3	5.8	34.8	E 2.3	11.8	1.1	4.5	100.0
1939	9,854	1,262	7,327	E 486	2,539	221	872	21,589	45.6	5.9	33.9	E 2.2	11.8	1.0	4.0	100.0
1940	11,290	1,245	7,662	E 175	2,726	243	917	23,908	47.2	5.2	32.1	E .7	11.4	1.0	3.8	100.0
1941	12,893	1,338	8,343	E 139	2,851	364	975	26,625	48.4	5.0	31.3	E .5	10.7	1.4	3.7	100.0
1942	14,149	1,435	7,987	E 320	3,102	367	1,177	27,897	50.7	5.2	28.6	E 1.1	11.1	1.3	4.2	100.0
1943	15,557	1,450	8,538	E 310	3,481	379	1,347	30,442	51.1	4.8	28.1	E 1.0	11.4	1.2	4.4	100.0
1944	15,447	1,509	9,923	E 662	3,775	442	1,387	31,821	48.5	4.7	31.2	E 2.1	11.9	1.4	4.4	100.0
1945	14,661	1,311	10,199	E 580	3,973	491	1,486	31,541	46.5	4.2	32.3	E 1.8	12.6	1.5	4.7	100.0
1946	13,110	1,369	10,270	E 283	4,089	493	1,446	30,494	43.0	4.5	33.7	E .9	13.4	1.6	4.7	100.0
1947	14,302	1,224	11,065	E 262	4,518	564	1,459	32,870	43.5	3.7	33.7	E .8	13.8	1.7	4.4	100.0
1948	13,622	1,275	12,085	E 147	5,033	619	1,507	33,994	40.1	3.8	35.5	E .4	14.8	1.8	4.4	100.0
1949	11,673	958	11,402	I 57	5,289	660	1,565	31,604	36.9	3.0	36.1	I .2	16.7	2.1	5.0	100.0

Digitized by Google

1950	11,900	1,013	12,304	I 402	6,150	783	1,601	34,153	34.8	3.0	36.0	I 1.2	18.0	2.3	4.7	100.0
1951	12,285	940	13,807	I 107	7,248	874	1,502	36,913	33.3	2.5	37.6	I .3	19.6	2.4	4.3	100.0
1952	10,971	897	14,248	I 132	7,760	954	1,614	36,576	30.0	2.4	39.0	I .4	21.2	2.6	4.4	100.0
1953	11,182	711	14,912	I 180	8,156	1,006	1,550	37,697	29.7	1.9	39.5	I .5	21.6	2.7	4.1	100.0
1954	9,512	683	14,830	I 260	8,554	1,042	1,479	36,360	26.2	1.9	40.8	I .7	23.6	2.8	4.1	100.0
1955	11,104	599	15,936	I 372	9,232	1,196	1,497	39,956	27.8	1.5	39.9	I .9	23.1	3.0	3.8	100.0
1956	11,338	610	16,994	I 424	9,834	1,209	1,568	42,007	27.0	1.4	40.5	I 1.0	23.4	2.9	3.8	100.0
1957	10,838	528	16,960	I 368	10,416	1,242	1,563	41,920	25.8	1.3	40.5	I .9	24.8	3.0	3.7	100.0
1958	9,607	483	16,308	I 1,120	10,995	1,240	1,740	41,493	23.1	1.2	39.3	I 2.7	26.5	3.0	4.2	100.0
1959	9,566	478	[2] 16,994	[2] I 1,346	[2] 11,479	[2] 1,348	[2] 1,691	[2] 42,932	[2] 22.4	[2] 1.1	[2] 39.6	[2] I 3.1	[2] 26.8	[2] 3.1	[2] 3.9	100.0

[1] The heat values employed are: Anthracite, 12,700 B.t.u. per pound; bituminous coal and lignite, 13,100 B.t.u. per pound; crude oil, 5,800,000 B.t.u. per barrel; weighted average British thermal units on petroleum products by using 5,248,000 gasoline, 5,670,000 kerosine, 5,825,000 distillate, 6,287,000 residual, 6,064,800 lubricants, 5,537,280 wax, 6,636,000 asphalt, and 5,796,000 miscellaneous; natural gas, dry, 1,035 B.t.u. per cubic foot; natural-gas liquids weighted average British thermal units based on production; natural gasoline 110,000 B.t.u. per gallon, and LP-gas 95,500 B.t.u. per gallon. Waterpower converted to coal equivalent at the prevailing rate of pounds of coal per kilowatt hour each year at central electric stations.

[2] Preliminary figure.

Digitized by Google

CONSUMPTION

Consumption of mineral fuels is measured in both B.t.u. content and in the physical units usual for the commodity concerned. Both measures indicate increases for natural gas and petroleum and very small declines for anthracite and bituminous in 1959.

Calculated Energy Consumption.—Total energy consumption expressed in British thermal units increased 3.5 percent in 1959. Consumption of energy is historically closely correlated with changes in gross national product, and the increase in 1959 reflects the increase in gross national product during the year. The share of total energy consumption furnished by coal decreased, reflecting continued losses to competitive fuels; the share contributed by natural gas and natural-gas liquids again reached alltime highs, and that of crude oil equaled the alltime previous record of 1956.

Consumption Patterns.—Bituminous coal and anthracite showed declines of 0.1 and 1.1 percent, respectively, in 1959, compared with an increase of 4.6 percent in crude petroleum runs to stills and an increase of 9.8 percent in apparent consumption of natural gas. Coke consumption and domestic demand for all oils increased 3.8 and 3.6 percent, respectively, in line with economic recovery.

The consumption of bituminous coal and lignite by electric utilities and coke plants increased materially in 1959. However, decreased consumption in the retail delivery group and in mining and manufacturing offset the increases, and there was virtually no change in the total. Consumption by Class I railroads declined again to a new low, reflecting the dieselization in this industry.

Space-heating and household markets use most of the anthracite consumed in the United States. Although consumption of anthracite for these purposes has been declining for a number of years, the quantity used for these purposes in 1959 remained approximately at the 1958 level. Consumption for electric-power production, the largest industrial use of anthracite, decreased 5 percent in 1959 and represented 14 percent of total consumption in this country. Exports of anthracite dropped 22 percent in 1959, compared with exports in 1958.

TABLE 7.—Apparent consumption of mineral fuels and related products

Commodity		1958	1959	Change from 1958 (percent)
Fuels:				
Bituminous coal	million net tons	366.7	366.3	−0.1
Crude petroleum, runs to stills	million barrels	2,789.4	[r] 2,917.7	+4.6
Natural gas	billion cubic feet	10,761.0	11,820.0	+9.8
Anthracite	million net tons	19.0	18.8	−1.1
Products:				
All oils, domestic demand [2]	million barrels	3,315.2	3,433.9	+3.6
Coke	million net tons	[r] 52.7	54.7	+3.8
Petroleum asphalt	do	17.5	18.6	+6.3

[1] Preliminary.
[2] Domestic demand will vary from consumption because of substantial secondary and consumers' stocks not reported to the Bureau of Mines.
[r] Revised figure.

Digitized by Google

TABLE 8.—Consumption of bituminous coal and lignite in the United States, 1958–59, by major consumer groups.

(Thousand net tons)

	Electric power utilities [1]	Class 1 railroads [2]	Coke plants	Steel and rolling mills	Cement mills	Other mining and manufacturing industries	Retail deliveries to other consumers	Bunker foreign and lake vessel [3]	Total
1958	152,928	3,725	76,580	7,268	8,256	81,372	35,619	955	366,703
1959	165,788	2,600	79,181	6,674	8,510	73,396	29,138	969	366,256

[1] Federal Power Commission.
[2] Association of American Railroads.
[3] U.S. Dept. of Commerce, Bureau of Census.

Sales of natural gas by consumer groups were generally higher than in 1958, whereas sales of fuel oil, although higher in total, showed a mixed pattern within the individual consumer groups. Most significant is the increase in the category of space heating and cooking.

TABLE 9.—Sales of fuel oil and natural gas in the United States 1958–59, by major consumer groups

(Fuel oil—thousand barrels; natural gas—million cubic feet)

Product and year	Railroads	Vessels	Gas and electric powerplants	Smelters, mines, and manufactures	Space heating and cooking	Military	Oil-company fuel	Miscellaneous	Total
Distillate fuel oil:									
1958	83,719	18,768	5,382	37,553	412,670	13,412	7,815	[1] 74,240	653,559
1959	87,802	19,250	5,005	33,007	416,763	11,394	8,642	77,129	658,992
Residual fuel oil:									
1958	5,772	106,269	[1] 76,995	143,142	105,639	37,428	46,463	9,659	531,367
1959	5,613	102,049	82,208	167,701	111,850	31,415	46,177	7,339	554,352
Natural gas:									
1958	----	----	[2] 872	[3] 7,175	[4] 2,714	----	----	----	10,761
1959	----	----	[2] 975	[3] 7,932	[4] 2,913	----	----	----	11,820

[1] Revised figure.
[2] Includes all commercial sales.
[3] Includes all industrial sales.
[4] Includes all residential sales.

STOCKS

Physical Stocks.—Physical stocks of major mineral fuels, except bituminous coal and lignite, were higher at the end of 1959 than at the end of 1958. The increases were not abnormal and could not be considered greater than was justified by current consumption.

LABOR AND PRODUCTIVITY

Employment.—The Bureau of Mines publishes two sets of employment figures for bituminous-coal mines. One set (presented in the next chapter of this volume) is unadjusted, for lack of coverage but is directly comparable to the reported injuries and is used for calculating injury rates. These data are adjusted for coverage, and the resulting adjusted data are published in the chapter on bituminous coal and used for the productivity analyses therein. Employment

Digitized by Google

TABLE 10.—Physical stocks of crude mineral fuels and products at yearend, 1955–59

(Producers' stocks, unless otherwise indicated)

	1959	1958	1957	1956	1955
Coal and related products:					
Bituminous and lignite [1]—net tons	79,654,678	80,263,680	85,503,119	82,888,617	72,561,387
Pennsylvania anthracite [2]—do	429,020	406,375	499,620	341,505	719,569
Coke—do	4,682,436	3,823,364	3,148,776	2,334,441	1,700,771
Petroleum and related products:					
Carbon black—thousand pounds	218,893	300,923	349,399	347,574	236,924
Crude petroleum and petroleum products—thousand barrels	[3] 808,042	[3] [4] 789,538	839,906	780,391	714,859
Crude petroleum—do	257,129	[4] 262,742	281,813	266,014	265,610
Natural-gas liquids—do	24,887	22,752	20,756	20,559	13,564
Gasoline—do	187,115	[4] 187,004	196,776	187,271	165,433
Distillate fuel oil—do	151,030	[4] 125,508	149,449	133,981	11,333
Residual fuel oil—do	53,261	[4] 59,560	59,959	44,491	39,174
Petroleum asphalt—do	10,951	9,757	10,463	9,150	7,768
Other refined products—do	123,669	[4] 122,215	121,290	118,925	111,977
Natural gas [5]—million cubic feet			191,396	136,470	67,934

[1] Stocks at industrial-consumer and retail yards and on upper Lake docks.
[2] Producers' stocks in ground storage.
[3] Includes Alaska.
[4] Revised figure.
[5] Net stores at year end.

figures for the anthracite industry represent full coverage for both productivity and injury analyses and are virtually identical. The U.S. Department of Labor, Bureau of Labor Statistics, publishes a third set of employment data, based upon payroll information. The Bureau of Employment Statistics of the U.S. Department of Labor publishes still another series based on reports to state agencies under unemployment security laws. Bureau of Labor Statistics data are presented in table 12 to facilitate comparison with Bureau of Mines figures. Table 11 indicates the order of difference between the Bureau of Labor Statistics data on total employment, the Bureau of Mines fully adjusted data, and the data of the Bureau of Employment Se-

TABLE 11.—Comparison of data on total employment in the mineral-fuel industries

(In thousands)

	Petroleum		Anthracite			Bituminous coal		
	BLS data [1]	BES data [2]	BLS data [1]	Mines data [3]	BES data [2]	BLS data [1]	Mines data [3]	BES data [2]
1954	303.8	283.7	40.1	44.0	40.0	228.5	227.4	222.4
1955	317.1	296.5	31.3	33.5	31.3	218.7	225.1	214.2
1956	324.8	314.0	29.3	31.5	29.7	228.6	228.2	229.0
1957	326.2	315.7	28.4	30.8	28.9	230.0	228.6	227.2
1958	302.6	313.2	20.3	26.5	23.3	195.2	197.4	192.7
1959	300.8	313.6	16.3	23.3	18.8	168.1	179.6	171.6

[1] Bureau of Labor Statistics, Employment and Earnings: May 1960. Table SB–1, p. 88. Average monthly employment.
[2] Bureau of Employment Statistics, Employment and Wages: 1954; 1955; 4th quarters 1956, 1957, 1958; table 4a (1954, 1955); table 4 (1956, 1957, 1958); Codes 11, 12, 13. Average monthly employment.
[3] Minerals Yearbook, 1954–59 (Salient Statistics tables for bituminous coal and lignite industry and for anthracite); and Dr. Young, Division of Bituminous Coal. Average men working daily.

Digitized by Google

curity. Generally the series move in the same direction but have differed markedly on several occasions.

The data presented in table 12 permit comparison between the various segments of the fuel mining and manufacturing industries. The drop in employment in bituminous coal clearly reflects the impact of the steel strike. Other segments were affected hardly at all by this event.

The decrease in bituminous employment (average of men working daily) occurred in spite of the increase in the number of days worked to 188 as compared with 184 in 1958. Anthracite showed a drop to 173 in days worked as compared with 183 in 1958.

Productivity.—The productivity of labor continued to increase in bituminous-coal mining and also rose in anthracite mining. The net tons per man per day reached 12.22 in bituminous-coal mining (an alltime high) and was 5.12 in anthracite mining (also an alltime record) as compared with 11.33 and 4.36, respectively, in 1958, and 6.43 and 2.87 in 1949, 10 years ago.

Hours and Earnings.—Average hourly earnings, average weekly hours and average weekly earnings increased for all segments of the mineral-fuels industry. The increases were greatest in bituminous coal, reflecting a rebound from the drop in 1957. Cyclical fluctuations were less marked in petroleum and natural gas.

Labor-Turnover Rates.—The data presented in table 14 are sensitive indicators of the state of business. The upturn in activity during 1959 is clearly reflected in both the accession and separation rates.

PRICES AND COSTS

Prices.—The average wholesale price index of fuels in 1959 was 112.7, the same as in 1958, as compared with an increase for all commodities to 119.5 from 119.2. Coal and petroleum declined somewhat, whereas other categories increased. Table 16 summarizes the actual price changes in representative mineral fuels.

Costs.—An index of major current input expenses in anthracite, bituminous-coal, and crude-petroleum mining has been constructed by the Office of Chief Economist. This index indicates the changes in operating costs due to changes in the prices of the component inputs. Indexes of the various inputs have been weighted according to the relative importance of the different categories of expense in 1954 in order to arrive at an index of total costs for each fuel. The index does not indicate the actual amounts spent in production of fuel. The components used in computing the index are labor, supplies (explosives, steel mill shapes, and others), fuels, and purchased electric energy. The labor input has been adjusted for productivity changes, using the data in table 18. Capital expenditures and amortization costs are not included. A comparable index for metal mining is presented in "Review of the Mineral Industries," Minerals Yearbook, volume I, 1959.

Digitized by Google

TABLE 12.—Total employment in the mineral-fuel industries in the continental United States by industries[1]

(Thousands)

	Mining					Manufacturing		
	Total	Anthracite	Bituminous coal	Crude-petroleum and natural-gas production	Petroleum and natural-gas production, except contract services[2]	Total products of petroleum and coal	Petroleum refining	Coke, other petroleum and coal products
1950–54 (average)	660.7	60.3	317.0	283.4	(3)	251.7	199.1	42.0
1955	567.1	31.3	218.7	317.1	189.0	252.8	201.3	51.5
1956	582.7	29.3	228.6	324.8	192.3	252.1	200.8	51.3
1957	584.6	28.4	230.0	326.2	193.8	240.5	190.1	50.4
1958	518.1	20.3	195.2	302.6	188.0	238.2	192.1	46.1
1959:								
January	508.2	19.5	192.4	296.3	181.1	232.3	186.6	45.7
February	498.5	18.1	188.2	292.2	180.2	227.2	181.5	45.7
March	489.9	16.4	179.6	293.9	179.7	236.4	189.0	47.4
April	488.5	15.3	176.2	297.0	179.8	236.6	188.9	47.7
May	492.6	15.1	176.4	301.1	179.5	237.2	189.5	47.7
June	501.9	15.3	177.9	308.7	182.8	238.3	190.2	48.1
July	499.1	17.1	171.3	310.7	184.0	237.5	189.3	48.2
August	460.9	15.4	135.8	309.7	183.7	229.9	183.2	46.7
September	457.9	15.6	136.3	306.0	181.8	231.7	185.4	46.3
October	460.0	16.0	145.4	298.6	178.4	229.7	184.0	45.7
November	478.1	15.9	164.3	297.9	177.7	231.7	182.9	48.8
December	486.4	15.7	173.7	297.0	177.9	232.2	184.2	48.0
Average, 1959	485.2	16.3	168.1	300.8	180.6	233.4	186.2	47.2

[1] U.S. Dept. of Labor, Bureau of Labor Statistics, latest revisions available June 1960. Published currently in the Monthly Labor Review, table A-2. Data are for all employees; those for production and nonsupervisory workers also are available in this publication.

[2] Not included in total because data are also included with crude-petroleum and natural-gas production.

[3] Data not available.

Digitized by Google

TABLE 13.—Average hours and gross earnings of production and nonsupervisory workers in the mineral fuels and related industries in the United States [1]

	Mining											
	Total fuels [2]			Anthracite			Bituminous coal			Petroleum and natural-gas production except contract services		
	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1950–54 (average)	$78.91	35.6	$2.23	$68.82	30.6	$2.26	$78.48	34.3	$2.29	$84.34	40.8	$2.07
1955	94.13	38.4	2.46	78.73	33.5	2.35	96.26	37.6	2.56	94.19	40.6	2.32
1956	102.61	38.6	2.66	78.90	32.9	2.40	106.22	37.8	2.81	101.68	41.0	2.48
1957	107.11	37.7	2.85	81.79	31.1	2.63	110.53	36.6	3.02	106.75	40.9	2.61
1958	103.51	36.1	2.87	76.01	28.9	2.63	[3] 102.38	[3] 33.9	3.02	[3] 109.75	40.8	2.69
1959:												
January	112.34	38.2	2.96	91.24	34.3	2.66	114.71	36.3	3.16	111.92	41.3	2.71
February	112.16	37.4	3.01	74.79	27.0	2.77	112.85	35.6	3.17	116.33	41.4	2.81
March	111.56	37.1	3.01	76.45	27.6	2.77	112.29	35.2	3.19	115.36	41.2	2.80
April	112.64	37.1	3.05	88.55	32.2	2.75	114.75	35.2	3.26	113.00	40.5	2.79
May	115.32	37.8	3.06	85.45	31.3	2.73	120.01	36.7	3.27	112.84	40.3	2.80
June	118.65	38.9	3.05	82.75	30.2	2.74	126.49	38.8	3.26	112.56	40.2	2.80
July	108.43	[4] 36.3	[3] 3.06	79.20	(5)	(5)	104.98	32.5	3.23	117.31	41.6	2.82
August	116.40	37.9	3.29	76.73	27.9	2.75	120.74	36.7	3.29	116.75	40.9	2.83
September	121.94	37.3	3.08	88.36	31.9	2.77	115.81	35.2	3.29	116.72	41.1	2.84
October	117.25	38.5	3.05	82.80	30.0	2.76	123.55	37.9	3.26	113.12	40.4	2.80
November	116.70	37.8	3.10	93.84	34.0	2.76	118.14	35.8	3.30	117.83	41.2	2.86
December	124.70	40.4	3.08	94.73	34.2	2.77	135.38	40.9	3.31	113.81	40.5	2.81
Average, 1959	115.67	37.9	3.07	84.98	30.9	2.75	118.30	36.4	3.25	114.93	40.9	2.81

See footnotes at end of table.

Digitized by Google

TABLE 13.—Average hours and gross earnings of production and nonsupervisory workers in the mineral fuels and related industries in the United States[1]—Continued

	Manufacturing								
	Total: Products of petroleum and coal			Petroleum refining			Coke, other petroleum, and coal products		
	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings	Weekly earnings	Weekly hours	Hourly earnings
1950–54 (average)	$84.73	40.8	$2.08	$88.29	40.5	$2.18	$75.72	41.7	$1.82
1955	97.00	41.1	2.36	100.37	40.8	2.46	86.31	41.9	2.06
1956	104.39	41.1	2.54	108.39	40.9	2.65	91.32	41.7	2.19
1957	108.39	40.9	2.65	112.88	40.9	2.76	96.00	41.2	2.33
1958	[3] 110.97	40.5	2.74	[3] 114.90	40.6	2.83	[3] 97.28	40.2	2.42
1959:									
January	113.70	40.9	2.78	117.55	41.1	2.86	101.71	40.2	2.53
February	114.86	40.3	2.85	119.77	40.6	2.95	99.04	39.3	2.52
March	118.24	41.2	2.85	121.18	40.8	2.95	108.46	42.7	2.52
April	118.20	40.9	2.89	122.29	40.9	2.99	104.30	40.9	2.55
May	117.67	41.0	2.87	121.58	40.8	2.98	105.41	41.5	2.54
June	117.79	40.9	2.88	120.39	40.4	2.98	108.29	42.3	2.56
July	118.78	41.1	2.89	121.80	40.6	3.00	109.48	42.6	2.57
August	116.12	40.6	2.86	118.50	39.9	2.97	108.03	42.7	2.53
September	120.77	41.5	2.91	124.53	41.1	3.03	108.20	42.6	2.54
October	117.50	40.8	2.88	119.80	40.2	2.98	108.03	42.7	2.53
November	118.90	41.0	2.90	124.01	41.2	3.01	103.17	40.3	2.56
December	117.74	40.6	2.90	121.80	40.6	3.00	105.30	40.5	2.60
Average, 1959	117.38	40.9	2.87	121.29	40.7	2.98	105.83	41.5	2.55

[1] U.S. Dept. of Labor, Bureau of Labor Statistics, latest revisions available June 1960. Published currently in Monthly Labor Review, tables A-3 and C-1.
[2] Weighted average computed by authors using employment as weights.
[3] Revised figure.
[4] Based on figures for bituminous-coal and petroleum and natural-gas production (except contract services) only.
[5] Figures not available.

Digitized by Google

TABLE 14.—Labor turnover, mineral fuels and related industries [1]

(Per thousand employees)

Rates, year, and month	All manufacturing	Products of petroleum and coal	Petroleum refining [2]	Anthracite mining	Bituminous-coal mining
Total accession rate:					
1958 average	30	7	4	16	12
1959:					
January	33	9	3	16	12
February	33	9	4	9	12
March	36	20	5	33	13
April	35	13	6	16	8
May	36	10	5	19	17
June	44	19	17	10	9
July	33	8	5	15	14
August	39	8	5	5	20
September	39	10	4	21	21
October	31	7	4	24	15
November	30	5	3	18	88
December	38	4	3	9	41
Average, 1959	36	10	5	16	23
Total separation rate:					
1958 average	36	13	10	43	25
1959:					
January	31	10	9	44	17
February	26	7	6	32	22
March	28	14	12	38	26
April	30	9	5	21	26
May	29	8	8	44	25
June	28	10	8	32	22
July	33	13	11	57	40
August	37	11	8	17	196
September	43	17	14	17	18
October	47	11	8	13	14
November	41	13	5	25	21
December	31	10	6	7	17
Average, 1959	34	11	8	29	36
Layoff rate:					
1958 average	23	6	3	37	20
1959:					
January	17	3	2	36	11
February	13	1	[3]	20	15
March	13	7	7	25	20
April	13	2	[3]	7	21
May	11	2	2	27	20
June	10	2	1	19	18
July	14	6	4	48	33
August	14	2	1	[3]	189
September	15	3	2	3	8
October	28	5	2	3	7
November	26	7	1	18	15
December	17	4	1	[3]	11
Average, 1959	16	4	2	17	31

[1] U.S. Dept. of Labor, Bureau of Labor Statistics, Monthly Labor Review, 1959 and 1960 (monthly issues).
[2] U.S. Dept. of Labor, Bureau of Labor Statistics, Office of Employment Statistics.
[3] Less than 0.5.

Digitized by Google

TABLE 15.—Average monthly wholesale price indexes for selected fuels, 1950–54 average and 1955–59 [1]

(1947–49=100)

(Unless otherwise specified)

	Fuels total	Coal	Coke	Gas [2]	Electricity [2]	Petroleum and products
1950–54 (average)	106.8	108.5	125.9	103.8	99.6	109.4
1955	107.9	104.8	135.2	111.6	97.4	112.7
1956	111.2	114.5	149.7	115.1	94.2	118.2
1957	117.2	124.4	161.7	116.1	95.5	127.0
1958	112.7	122.9	161.9	101.7	100.4	117.7
1959:						
January	113.9	125.3	163.1	112.7	100.7	118.2
February	114.8	126.2	170.4	112.0	100.8	119.5
March	115.0	124.6	170.4	113.1	100.9	119.9
April	114.0	119.3	170.4	108.6	100.8	119.4
May	113.4	118.9	170.4	109.9	100.9	118.3
June	111.2	119.8	170.4	106.8	100.8	115.0
July	111.1	121.1	170.4	105.8	100.8	114.8
August	112.2	122.0	170.4	109.2	100.6	116.2
September	111.9	123.0	170.4	112.8	100.8	115.1
October	111.4	123.6	170.4	111.1	100.7	114.5
November	111.2	124.0	170.4	113.8	100.7	113.9
December	111.7	124.1	170.4	115.5	101.2	114.3
Average, 1959	112.7	122.6	169.8	110.9	100.8	116.6

[1] U.S. Dept. of Labor, Bureau of Labor Statistics, Monthly Labor Review.
[2] Gas and electricity beginning January 1958, January 1958=100.

TABLE 16.—Comparative fuel prices, 1958–59

Fuel		1958	1959
Bituminous coal:			
Average prices:			
Railroad fuel, f.o.b. mine [1]	dollars/net ton	[2] 5.64	5.63
Average retail price [3]	do.	16.53	16.89
Cost of coal at merchant coke ovens	do.	10.74	10.49
Anthracite, average sales realization per net ton on shipments to points outside regions, excluding dredge coal:			
Chestnut	dollars	12.28	11.41
Pea	do.	9.87	9.42
Buckwheat No. 1	do.	9.05	8.73
Petroleum and petroleum products:			
Crude petroleum, average price per barrel at well	do.	3.01	2.90
Gasoline, average dealers' net price (excluding taxes) of gasoline in 55 U.S. cities [4]	cents/gallon	16.22	16.09
Residual fuel oil:			
No. 6 fuel oil, average of high and low prices in Philadelphia [4]	dollars/barrel (refinery)	2.69	2.68
Bunker C, average price for all Gulf ports [4]	do.	2.25	2.05
Distillate, fuel oil:			
No. 2 distillate, average of high and low prices at Philadelphia [4]	cents/gallon (refinery)	9.59	9.86
No. 2 distillate, average price at all Gulf ports [4]	do.	9.12	9.24
Natural gas:			
Average U.S. value, at well	cents/thousand cubic feet	11.9	12.9
Average U.S. value, at points of consumption	do.	46.2	47.7
Average wholesale price index for all commodities [3]		119.2	119.5

[1] Interstate Commerce Commission.
[2] Revised figure.
[3] U.S. Dept. of Labor, Bureau of Labor Statistics, published and unpublished wholesale prices and price indexes.
[4] Platt's Oil Price Handbook.

The indexes of major input expenses in anthracite and bituminous-coal mining have been relatively constant or slightly declining in a period of great increases in productivity and rapid rise in wage rates.

Digitized by Google

TABLE 17.—Indexes of major input expenses adjusted for productivity of labor, mineral-fuel mining [1]

(1950=100)

	Anthracite	Bituminous coal	Crude petroleum and natural gas
1949	95	100	----------
1950	100	100	100
1951	107	106	104
1952	106	104	108
1953	107	104	109
1954	91	94	115
1955	90	93	116
1956	88	97	121
1957	96	102	127
1958	93	98	134
1959	86	97	132

[1] Revised series. (See section on Costs, in this chapter.)

However, in crude petroleum and natural gas the index has risen approximately 32 percent since 1950. Since wage rates have been rising in this industry, it appears that productivity has not been increasing here as rapidly as in the coal industry.

Relative Labor Costs.—The most important element in operating costs is, of course, wages and salaries. The index of relative labor costs adjusts average earnings by changes in productivity to indicate the direction of movement in real labor costs per ton of coal. When the changes in value of a ton of coal are considered, an index of labor costs per dollar of product is obtained. The changes in labor costs per ton and per dollar of product have been remarkably slight in the coal industries since 1949 and reached a low point in 1959.

TABLE 18.—Indexes of relative labor cost, mineral-fuel mining, 1949–1959

(1950=100)

	Index of labor costs per unit of output [1]			Index of value of product per man-period [2]			Index of labor cost per dollar of product [3]		
	Anthracite	Bituminous	Petroleum	Anthracite	Bituminous	Petroleum	Anthracite	Bituminous	Petroleum
1949	94	102	----------	97	96	----------	99	101	----------
1950	100	100	100	100	100	100	100	100	100
1951	106	106	97	112	106	112	100	104	97
1952	106	103	108	111	112	108	103	102	108
1953	107	102	113	122	123	115	101	101	106
1954	86	88	120	133	131	115	91	94	109
1955	85	88	118	120	135	120	100	94	108
1956	81	92	124	134	151	122	91	92	113
1957	90	96	132	144	164	135	93	92	108
1958	87	90	146	154	168	122	87	90	122
1959	77	88	140	170	184	128	82	88	122

[1] Anthracite and bituminous indexes based upon net tons per man per day (from chapters on Coal, Minerals Yearbook, 1959, vol. II), and index of average earnings derived from Bureau of Labor Statistics data on hourly earnings; petroleum index based upon barrels per year (from chapter on Petroleum, Minerals Yearbook, 1959, vol. II) and Bureau of Employment Security data on total wages in petroleum production.

[2] Anthracite and bituminous indexes based upon net tons per man per day and mine values of production; petroleum index based upon average employment and total value of production.

[3] Anthracite and bituminous indexes based upon index of value per man-day and index of average earnings; petroleum index based upon total value of production and total wages.

Digitized by Google

Table 19 shows the fuel cost in cents per million B.t.u. of electric power generated for the major mineral fuels by Regions of the United States. This table serves as an index of the price of the various fuels to a major consuming industry.

TABLE 19.—Cost of fuel in electric-power generation [1]

(Cents per million B.t.u.)

Region	Coal	Oil	Gas	Coal	Oil	Gas	Coal	Oil	Gas
	1959			1958			1957		
New England	37.7	35.8	34.5	40.1	40.7	37.8	41.0	46.9	40.7
Middle Atlantic	30.8	35.5	33.0	32.3	38.5	32.0	31.9	45.9	32.1
E. North Central	25.6	73.2	[2] 24.5	25.8	68.5	24.6	25.8	68.2	23.1
W. North Central	27.5	46.7	22.4	28.1	51.3	22.0	28.2	47.6	22.2
South Atlantic	27.2	35.5	[3] 29.7	28.6	39.7	27.6	29.0	46.2	25.8
E. South Central	19.1	47.1	23.4	19.4	37.6	21.6	19.4	46.1	21.6
W. South Central	15.8	43.2	15.0	15.6	41.8	12.9	14.9	41.7	12.9
Mountain	21.3	24.3	25.7	21.9	25.2	22.2	22.0	25.1	22.2
Pacific	------	34.8	32.0	------	42.0	26.5	------	41.5	26.5
Average, United States	26.5	35.2	22.3	27.4	39.6	19.5	27.5	44.4	19.5
	1956			1955			1954		
New England	38.8	41.4	37.9	35.4	36.6	36.0	35.3	34.7	33.6
Middle Atlantic	30.0	40.2	31.9	28.4	35.7	30.8	28.6	33.9	29.4
E. North Central	24.6	74.3	21.7	23.9	69.1	22.2	24.9	57.5	22.4
W. North Central	26.9	43.4	22.1	26.5	31.0	22.6	27.2	31.6	22.0
South Atlantic	28.1	39.5	25.2	25.9	36.0	25.3	26.6	33.8	23.1
E. South Central	18.7	42.4	19.8	18.3	43.8	18.3	19.2	44.2	17.1
W. South Central	15.2	40.4	12.4	20.5	40.0	11.4	11.6	39.1	10.5
Mountain	22.0	26.0	22.0	21.7	24.9	21.6	22.5	24.0	20.0
Pacific	------	33.0	25.0	------	27.8	23.8	------	28.5	22.8
Average, United States	26.2	37.9	18.5	25.2	33.2	18.0	26.1	32.8	17.3

[1] Federal Power Commission S-123, 11th Ann. Supp., 1959.
[2] Excludes blast-furnace gas, which would lower cost slightly.
[3] Includes plants using natural gas.

INCOME AND INVESTMENT

National Income Originated.—The mining industry as a whole recovered somewhat (approximately 2 percent) from the low of 1958 in national income originated. The metal, anthracite, and bituminous-coal mining components all declined below 1958, but the recovery in crude petroleum and natural gas as well as nonmetallic

TABLE 20.—National income by industrial origin, selected industries [1]

Industry	1958 (millions)	Change from 1957 (percent)	1959 (millions)	Change from 1958 (percent)
All industries	$367,686	+0.20	$399,648	+8.69
Mining	5,357	−14.12	5,471	+2.13
Metal mining	757	−20.40	716	−5.42
Anthracite mining	130	−19.75	113	−13.08
Bituminous- and other soft-coal mining	1,223	−22.05	1,198	−2.04
Crude petroleum and natural gas	2,476	−10.52	2,600	+5.01
Nonmetallic mining and quarrying	771	−2.28	844	+9.47
Manufacturing	104,125	−7.42	119,400	+14.67
Products of petroleum and coal	4,037	+2.02	4,543	+12.53

[1] U.S. Department of Commerce, Survey of Current Business, July 1960, table I-10.

Digitized by Google

mining and quarrying more than offset this loss. The manufacturing category of products of petroleum and coal increased 12.5 percent as compared with an increase of 14.7 percent in all manufacturing.

Investment.—Data on total investment in fuels are not available. Table 21 presents data on direct private investments abroad in the petroleum industry. The only information available on book values of domestic investments is that contained in the statistical summary of balance-sheet data from corporate-income tax returns. These reports are issued after a delay of almost 2 years, but preliminary data are available for 1959. As compared with a total book value of $10.4 billion in foreign investments at the end of 1959 for petroleum industries, the total book value of crude petroleum and products (including coal products) was $45 billion. (To indicate the growth in domestic investment, the figure for fiscal 1952 was $28.9 billion.)

Indicated current rates of investment are given by data on expenditures for new plants and equipment in the mining and manufacturing industries and by data on gross proceeds of new corporate security offerings. Expenditures for new plants and equipment recovered somewhat from the low point of 1958 in both mining and manufacturing.

TABLE 21.—Direct private investment of the United States companies in foreign petroleum industries, 1959 [1 2]

(Million dollars; net inflows to the United States (−))

Country	Petroleum				All industries			
	Book value, beginning of year	Net capital movements	Undistributed earnings of subsidiaries	Book value, end of year	Book value, beginning of year	Net capital movements	Undistributed earnings of subsidiaries	Book value, end of year
Canada	2,293	113	44	2,465	9,338	409	393	10,171
Latin American Republics:								
Brazil	93	−2	1	82	795	45	34	839
Central America and West Indies	205	21	12	238	1,610	86	60	1,756
Colombia	225	(3)	(3)	225	383	10	6	399
Mexico	32	−2	(3)	30	745	−6	20	759
Venezuela	2,071	82	11	2,164	2,658	97	53	2,808
Total [4]	2,825	129	31	2,963	7,751	338	202	8,218
Dependencies in Western Hemisphere	322	29	−3	349	696	51	24	772
Western Europe	1,320	148	−7	1,453	4,573	466	258	5,300
Africa	299	23	16	338	746	48	49	843
Middle East	1,195	−16	−10	1,170	1,224	−8	−9	1,208
Far East	482	−12	22	492	954	9	65	1,028
International enterprises [5]	751	91	−5	838	1,188	98	34	1,320
Grand total	9,817	511	109	10,423	27,255	1,439	1,081	29,735

[1] Balance of Payments Division, Office of Business Economics, U.S. Department of Commerce. Data are preliminary.

[2] Other adjustments to yearend book values, in millions of dollars, are as follows, for petroleum and all industries, respectively: Canada, 16, 31; Latin American Republics, −22, −74; Brazil, −10, −35; Western Europe, −8, 3; Total, all areas, −24, −75.

[3] Less than $500,000.

[4] Includes countries not shown above.

[5] Includes shipping enterprises registered in Liberia and Panama but operating worldwide.

Digitized by Google

TABLE 22.—Expenditures on new plant and equipment by firms in mining and selected mineral manufacturing industries [1]

(Million dollars)

Industry	1957	1958	1959	1959			
				January-March	April-June	July-September	October-December
Mining [2]	1,243	941	987	213	243	256	275
Manufacturing:							
Primary iron and steel	1,722	1,192	1,036	208	273	219	336
Primary nonferrous metals	814	441	313	71	86	70	86
Stone, clay and glass products	572	399	529	113	135	133	148
Chemicals and allied products	1,724	1,320	1,235	260	302	310	363
Petroleum and coal products	3,453	2,431	2,491	518	619	629	725
Total, manufacturing	15,959	11,433	12,067	2,456	3,021	3,019	3,571

[1] U.S. Dept. of Commerce, Office of Business Economics, Survey of Current Business: vol. 40, March 1960, p. 16.
[2] Including fuels.

TABLE 23.—Estimated gross proceeds of new corporate securities offered for cash in the United States in 1959 [1]

Type of security	Total corporate		Manufacturing		Mining [2]	
	Value (millions)	Percent	Value (millions)	Percent	Value (millions)	Percent
Bonds	$7,190	74	$1,519	73	$86	54
Preferred stock	531	5	103	5	2	1
Common stock	2,027	21	451	22	73	45
Total	9,748	100	2,073	100	161	100

[1] U.S. Securities and Exchange Commission, Statistical Bulletin, vol. 19, May 1960, p. 3. Substantially all new issue of securities offered for cash sale in the United States in amounts over $100,000 and with terms to maturity of more than 1 year are covered in these data.
[2] Including fuels.

TRANSPORTATION

As indicated in table 24, within recent years the methods of shipping bituminous coal and lignite from the mines have changed radically; shipments by rail have declined, whereas shipments by water and truck have increased. Generally, the cost by water or truck, particularly for short distances, is less than the rail freight rate. Transportation costs comprise a significant portion of the delivered price of coal, thus placing it at a competitive disadvantage with oil and natural gas, which are moved by tankers and pipelines. About 73 percent of all coal moves by rail, and freight adds as much as 70 percent to the mine price of coal. As a consequence, considerable attention is being given to means of substantially reducing transportation costs. Among these are locating large coal-consuming industries at or near coal sources (particularly near water transportation), increased barging and trucking of coal, and transmitting electric energy directly from mine-located generating plants.

Digitized by Google

The total movement of mineral fuels and related products by rail and water is summarized in table 25.

TABLE 24.—Method of shipment of bituminous coal and lignite from mines, and used at mines, in the United States, 1955–59

	Method of shipment from mines			Used at mines [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
	Thousand net tons				
1955	355,924	47,476	51,607	9,626	464,633
1956	390,015	50,732	49,768	10,359	500,874
1957	380,471	51,171	50,334	10,728	492,704
1958	305,642	43,899	50,605	10,300	410,446
1959	300,763	45,954	52,564	12,747	412,028
	Percentage of total				
1955	76.6	10.2	11.1	2.1	100.0
1956	77.9	10.1	9.9	2.1	100.0
1957	77.2	10.4	10.2	2.2	100.0
1958	74.5	10.7	12.3	2.5	100.0
1959	73.0	11.1	12.8	3.1	100.0

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyors or trams, made into beehive coke at mines, and all other uses at mines.

TABLE 25.—Rail and water transportation of mineral fuels and related products in the United States, 1958–59, by products

(Thousand short tons)

Product	Rail [1]			Water [2]		
	1958	1959	Change from 1958 (percent)	1958	1959 [3]	Change from 1958 (percent)
Coal:						
Anthracite [4]	23,770	20,358	−14	865	814	−6
Bituminous [4]	307,492	307,226	0	126,688	130,040	+3
Coke [4]	12,635	16,155	+28	279	285	+2
Crude petroleum	1,196	1,531	+28	67,888	73,068	+8
Gasoline	8,366	8,172	−2	92,226	93,010	+1
Distillate fuel oil	8,475	8,066	−5	72,541	73,176	0
Residual fuel oil				42,432	45,287	+7
Asphalt	3,356	2,944	−12	3,611	4,118	+14
Kerosine	14,777	12,631	+7	9,346	9,325	0
Other [5]				10,626	12,115	+14
Total	380,067	377,083	−1	426,502	441,238	+3

[1] Revenue freight originated, excluding forwarder and less than carload shipments, for which categories commodity detail is not available. Source: Interstate Commerce Commission, Freight Commodity Statistics, Class 1 Steam Railways in United States, for years ended Dec. 31, 1958 and 1959: Statements 59100 and 60100.

[2] Domestic Traffic; that is, traffic with Canal Zone, the Virgin Islands, and military cargoes carried in Defense Department vehicles are excluded. Source: Department of the Army, Waterborne Commerce of the United States, Calendar Year 1958, part 5, National Summaries and preliminary tabulations for 1959.

[3] Preliminary figures.

[4] Figures for rail shipments include briquets. Since water-shipment briquets are not reported by type of material, they are included in "Other." The rail figure for anthracite shipments includes shipments to washeries and breakers.

[5] "Other" includes: Transportation by water—lubricants, jet fuel, and napthene; by rail—lubricants, petroleum products, and gases.

Digitized by Google

Table 27 shows the costs of transporting coal by rail in the United States and an index of dry cargo and tanker rates in international trade. Domestic rail costs have been moving slowly upward since 1954. Transportation costs in international trade fluctuate more and show the effects of international crises. International rates were substantially down in 1958 and 1959.

TABLE 26.—Freight costs in domestic and international trade

	Domestic [1]		Foreign	
	Average revenue per ton (dollars)		Dry cargo [2] time charter	Tanker [2]
	Anthracite (n.o.s.)	Bituminous		
1953	3.35	3.33	100	100
1954	3.31	3.23	118	80
1955	3.33	3.24	214	83
1956	3.39	3.45	285	103
1957	3.52	3.57	198	109
1958	3.68	3.58	92	92
1959	3.65	3.45	92	82

[1] Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Freight Commodity Statistics.
[2] United Nations, Monthly Bulletin of Statistics, June 1960. 1953=100.

DISTRIBUTION OF BITUMINOUS COAL AND LIGNITE

Tables 27, 28, and 29 summarize the distribution of bituminous coal and lignite in 1959 from coal-producing districts of origin to States of destination, by methods of transportation and types of consumer use. This information shows the participation of the bituminous-coal and lignite industry in the various energy markets of the Nation, both locally and nationally. It also provides benchmarks for special studies and analyses of the many factors that influence coal production and its utilization in the highly competitive energy market.

The information is based upon reports submitted to the Bureau of Mines voluntarily by producers, sales agents, distributors, and wholesalers who normally produce or sell 100,000 tons or more annually. The unprecedented cooperation of these respondents resulted in their reporting about 94 percent of all coal produced or shipped during the year. To account for total industry shipments, estimates for the remaining shipments are included, based on data from coal trade and other reliable coal statistical reporting agencies.

Details of the distribution survey are shown in Bureau of Mines Mineral Market Report 3035.

Digitized by Google

TABLE 27.—Distribution of bituminous coal and lignite, 1959, by method of movement and consumer use

(Thousand net tons)

Shipments	Consumer use					
	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
Total shipments to all destinations in the United States, Canada, and Mexico by all methods of movement and consumer use and overseas exports	167,390	83,316	33,814	97,386	2,889	1,907
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Methods of movement:						
All-rail	75,642	38,928	23,325	62,013	----------	----------
River and ex-river	38,645	23,393	1,255	6,228	----------	----------
Great Lakes [1]	15,475	14,196	3,914	12,680	----------	----------
Tidewater [2]	14,100	5,322	575	2,978	----------	----------
Truck	13,307	805	4,734	13,147	----------	----------
Tramway, conveyor, and private railroad	10,221	672	11	340	----------	----------
Methods of movement and/or consumer uses unknown	----------	----------	----------	----------	2,889	1,907
Total	167,390	83,316	33,814	97,386	2,889	1,907

	Canadian Great Lakes commercial docks [3]	U.S. Great Lakes dock storage [3]	U.S. Tidewater dock storage [3]	Overseas exports [4]	Net change in mine inventory	Total
Total shipments to all destinations in the United States, Canada, and Mexico by all methods of movement and consumer use, and oversea exports	1,612	304	26	24,835	−1,234	412,245
Shipments to all destinations in the United States, Canada, and Mexico by specific method of movement and consumer use:						
Methods of movement:						
All-rail	----------	----------	----------	----------	----------	199,908
River and ex-river	----------	----------	----------	----------	----------	69,521
Great Lakes [1]	----------	----------	----------	----------	----------	46,265
Tidewater [2]	----------	----------	----------	----------	----------	22,975
Truck	----------	----------	----------	----------	----------	31,993
Tramway, conveyor, and private railroad	----------	----------	----------	----------	----------	11,244
Methods of movement and/or consumer uses unknown	1,612	304	26	24,835	−1,234	30,339
Total	1,612	304	26	24,835	−1,234	412,245

[1] Excludes shipments to Canadian Great Lakes commercial docks and U.S. dock storage for which consumer uses are not available; however, includes vessel fuel, the destinations of which are not available.
[2] Excludes oversea exports and U.S. tidewater dock storage for which consumer uses are not available; however, includes bunker fuel, the destinations of which are not available.
[3] Consumer use unknown.
[4] Excludes Canada; consumer use unknown.

Digitized by Google

TABLE 28.—Distribution of bituminous coal and lignite, 1959, by district of origin and consumer use

(Thousand net tons)

District of origin [1]	Consumer use					
	Electric utilities	Coke and gas plants	Retail dealers	All others	Railroad fuel	Used at mines and sales to employees
1	14,771	3,267	1,257	10,193	280	384
2	8,025	20,717	749	5,878	37	271
3 and 6	21,370	(2)	[3] 17,049	(2)	290	20
4	20,390	10	1,797	10,992	430	60
7	3,418	15,107	4,391	3,671	(3)	147
8	31,365	25,639	12,013	27,018	517	819
9	21,601	5	3,034	5,039	247	
10	24,410	696	5,135	14,926	520	59
11	8,499		1,032	4,920	191	43
12	691		61	419		
13	6,150	6,422	295	1,141	(3)	25
14		(2)	[3] 1,127	(2)		
15 [4]	2,512	(2)	[3] 1,641	(2)	92	1
16	496		153	252		6
17	463	1,156	310	436	3	6
18	29		14	63		10
19	900		224	596	176	29
20	441	2,213	1,002	680	10	20
21	1,236		556	653	19	1
22 and 23	623		124	443	14	6
Total	167,390	83,316	33,814	97,386	2,889	1,907

District of origin [1]	Canadian Great Lakes commercial docks [5]	U.S. Great Lakes dock storage [5]	U.S. tidewater dock storage [5]	Overseas exports [6]	Net change in mine inventory	Total
1	109	−1	14	1,181	15	31,470
2	25	2			−138	35,566
3 and 6	246	−8		653	−147	39,473
4	129	223			12	34,043
7	12	104	1	[7] 11,015	−841	37,025
8	1,091	−66	11	11,831	−5	110,233
9		15			−8	29,933
10		35			−26	45,755
11					8	14,693
12						1,171
13				[7] 124	−38	14,119
14						1,127
15 [4]					−11	4,235
16					2	909
17					2	2,376
18						116
19					−7	1,918
20				94	−54	4,406
21					1	2,466
22 and 23					1	1,211
Total	1,612	304	26	24,835	−1,234	412,245

[1] Producing districts are defined in Mineral Market Report 3035, March 1960.
[2] Shipments to coke and gas plants and all others are included with retail dealers.
[3] Included in overseas exports.
[4] Excludes Texas.
[5] Consumer use unknown.
[6] Excludes Canada, consumer use unknown.
[7] Excludes shipments for railroad fuel use.

Digitized by Google

TABLE 29.—Distribution of bituminous coal and lignite, 1959, by destination and consumer use

(Thousand net tons)

Destination	Consumer use				
	Total	Electric utilities	Coke and gas plants	Retail dealers	All others
New England:					
Massachusetts	4,924	2,672	525	292	1,435
Connecticut	3,845	2,558	560	66	661
Maine, New Hampshire, Vermont, and Rhode Island	2,381	1,106	5	200	1,070
Middle Atlantic:					
New York	22,974	11,180	4,053	536	7,205
New Jersey	6,087	3,537	830	99	1,621
Pennsylvania	46,021	15,083	20,730	1,248	8,960
East North Central:					
Ohio	[1] 50,071	[1] 20,450	12,570	4,008	13,043
Indiana	[1] 31,000	[1] 13,442	9,481	2,416	5,661
Illinois	39,720	18,066	3,064	7,275	11,315
Michigan	27,231	10,675	4,489	2,892	9,175
Wisconsin	13,220	5,727	499	2,742	4,252
West North Central:					
Minnesota	5,378	2,291	883	809	1,395
Iowa	5,062	2,080	----------	1,039	1,943
Missouri	6,944	3,077	248	1,240	2,379
North Dakota and South Dakota	2,434	1,205	----------	709	520
Nebraska and Kansas	1,205	499	----------	254	452
South Atlantic:					
Delaware and Maryland	8,122	3,592	3,012	441	1,077
District of Columbia	1,105	661	----------	151	293
Virginia	11,147	6,091	41	1,145	3,870
West Virginia	14,143	6,018	4,536	205	3,384
North Carolina	8,946	5,552	----------	985	2,409
South Carolina	3,444	1,507	----------	309	1,628
Georgia and Florida	3,775	2,913	7	325	530
East South Central:					
Kentucky	11,301	7,424	1,459	704	1,714
Tennessee	[2] 13,744	[2] 10,779	187	931	1,847
Alabama and Mississippi	[2] 13,862	[2] 6,234	6,419	269	940
West South Central: Arkansas, Louisiana, Oklahoma, and Texas	1,387	----------	832	58	497
Mountain:					
Colorado	2,781	956	823	309	693
Utah	2,508	441	1,474	241	352
Montana and Idaho	941	179	----------	507	255
Wyoming	894	719	----------	59	116
New Mexico	113	27	----------	26	60
Arizona and Nevada	109	5	----------	12	92
Pacific:					
Washington and Oregon	897	----------	----------	362	535
California	1,497	----------	1,476	5	16
Alaska	685	444	----------	68	173
Canada	10,393	200	5,113	877	4,203
Mexico	54	----------	----------	----------	54
Destination and/or consumer uses not available:					
Great Lakes movement:					
Canadian commercial docks	1,612	----------	----------	----------	----------
Vessel fuel	1,544	----------	----------	----------	----------
U.S. dock storage	304	----------	----------	----------	----------
Tidewater movement:					
Oversea exports (except Canada)	24,835	----------	----------	----------	----------
Bunker fuel	17	----------	----------	----------	----------
U.S. dock storage	26	----------	----------	----------	----------
Railroad fuel:					
U.S. companies	2,513	----------	----------	----------	----------
Canadian companies	376	----------	----------	----------	----------
Coal used at mines and sales to employees	1,907	----------	----------	----------	----------
Net change in mine inventory	−1,234	----------	----------	----------	----------
Total	412,245	----------	----------	----------	----------

[1] District 9 shipments via river and ex-river to Ohio electric utilities are included with Indiana electric utilities.

[2] District 10 shipments via river and ex-river to Alabama and Mississippi electric utilities are included with Tennessee electric utilities.

Digitized by Google

WORLD REVIEW

In value terms the United States became a net importer of mineral fuels in 1958. In that year imports exceeded exports by $560 million. In 1959 the trend continued, and imports exceeded exports by $694 million. The value of imports and exports grouped by the Standard International Trade Classification (SITC) of the United Nations, are presented in table 30.

In 1959 total U.S. exports of bituminous coal and anthracite were 39 million short tons, compared with 52.6 million tons in 1958, or a decrease of 26 percent. The fall in demand for U.S. coal in Europe accounted for 13.8 million less tons in the total shipments to that area than in the preceding year. Canada, Argentina, and Japan were the

TABLE 30.—Value of imports and exports, mineral fuels and products, 1957–59 [1]

(Thousand dollars)

[U.S. Department of Commerce]

SITC No.	Group and commodity	Imports for consumption [2]			Exports of domestic merchandise		
		1957	1958	1959	1957	1958	1959
311-01	Coal: Anthracite, bituminous, subbituminous, lignite.	3,155	2,581	2,455	828,684	525,643	378,204
311-02	Coke: Coal and lignite	1,544	1,571	1,441	14,356	7,127	8,674
311-03	Briquets: Coal, lignite, coke, and peat.	10	2	3	1,383	899	495
	Total: Coal and related products.	4,709	4,154	3,899	844,423	533,669	387,373
312-01	Petroleum, crude and partly refined for further refining.	986,144	995,990	940,543	175,593	[3] 20,156	[3] 13,829
313-01	Motor spirit (gasoline and other light oils for similar uses), including gasoline blending agents.	48,353	111,070	64,644	206,014	142,045	108,757
313-02	Lamp oil and white spirit (kerosine, illuminating oil).	537	148	536	22,236	6,063	5,632
313-03	Gas, diesel, and other fuel oils	496,072	498,851	505,220	278,114	117,464	91,838
313-04	Lubricating oils and greases, including mixtures with animal and vegetable lubricants.	15	112	35	209,965	193,261	189,051
313-05	Mineral jelly and waxes, including petrolatum.	1,041	1,347	2,055	28,839	[3] 25,945	[3] 28,564
313-09	Pitch, resin, petroleum asphalt, coke of petroleum and other byproducts of coal, lignite, petroleum and oil shale, including mixtures with asphalt, n.e.s., not chemicals.	18,885	19,784	19,553	30,252	31,321	30,949
314-01	Gas, natural	3,317	21,821	26,329	12,356	14,655	6,263
314-02	Gas, manufactured	----------	----------	----------	21,100	8,423	6,791
	Total: Petroleum and related products.	1,554,364	1,649,123	1,558,915	984,469	559,333	481,674
	Total fuels	1,559,073	1,653,277	1,562,814	1,828,892	1,093,002	869,047
	Total nonfuels (includes scrap but excludes wrought metals)	2,145,972	1,572,731	1,863,497	815,900	541,807	561,667
	Total minerals	3,705,045	3,226,008	3,426,311	2,644,792	1,634,809	1,430,714

[1] Grouping of commodities based upon Standard International Trade Classification of United Nations. Basic data compiled by Office of Chief Economist, Bureau of Mines, from supplement to Annual Statistical Bulletin, Series IV, by Organization for European Economic Cooperation, which represents conversion of U.S. import and export classification to SITC categories. Actual import and export data from U.S. Dept. of Commerce reports FT-110 and FT-410. Since SITC may differ from that used by Bureau of Mines, values shown may not compare with those in commodity chapters.

[2] Includes items entered for immediate consumption, withdrawn from bonded storage warehouses for consumption, and items withdrawn from bonded smelting and refining warehouses for consumption or export.

[3] Not strictly comparable with earlier years because of changes in classification of export statistics.

Digitized by Google

only countries taking sizable increased tonnage of U.S. coal. The combined increase in movements to these areas, when compared with those of 1958, was approximately 1.1 million tons.

The decline in Europe's demand for coal continued through 1959, although in some countries the downward rate was less severe than in 1958. Despite improvement in some areas, total European consumption failed to recover enough to balance with indigenous production and import commitments. Coal stocks at the mines in Western Europe at the close of 1959 reached an alltime high of approximately 68 million metric tons (15 million tons in 1957). It is apparent that, in the light of a general recovery in industrial activity requiring increasing amounts of energy, the present depression in Europe's consumption of coal is mainly the result of a rapid shift from coal to oil.

World Production.—Estimated 1959 coal production (bituminous, anthracite, and lignite) was 2,518 million metric tons, approximately 78 million tons above the 1958 total. Most of the increase is attributed to the rapid growth in communist China's output. Anthracite and bituminous coal accounted for 75 percent, or 1,894 million tons of total production; the remaining 25 percent, or 624 million tons, comprised lignitic types. The outstanding development in the 1959 output was the record production of 347.8 million tons in mainland China, which reflected an increase of 77.8 million tons when compared with 1958.

The U.S.S.R. retained its position in 1959 as the largest coal producer. This status, however, is obscured to some extent by the fact that a high percentage of this country's output consists of subbituminous and lignitic coals. Approximately 29 percent of the U.S.S.R.'s total output is classed as lignite. By comparison, 99.4 percent of the United States production is high-quality coal.

TABLE 31.—Comparison of world and U.S.[1] production of principal fuels, 1958–59

Mineral	1958			1959		
	World	United States		World	United States	
	Thousand short tons		Percentage of world production	Thousand short tons		Percentage of world production
Coal:						
Bituminous	1,836,437	408,019	22	1,902,134	409,248	22
Lignite	678,265	2,427	(2)	687,771	2,780	(2)
Pennsylvania anthracite	175,100	21,171	12	186,000	20,649	11
Coke (excluding breeze):						
Gashouse [3]	51,308	(4)	(4)	49,960	(4)	(4)
Oven and beehive	281,459	53,604	19	289,795	55,863	19
Fuel briquets and packaged fuel	117,610	1,071	(2)	114,650	900	(2)
Natural gas (marketable) million cubic feet	(5)	11,030,298	(5)	(5)	(5)	(5)
Peat	65,510	328	(2)	70,600	419	(2)
Petroleum (crude)...thousand barrels	6,607,856	2,449,016	37	7,127,310	2,574,590	36

[1] Including Alaska and noncontiguous territories.
[2] Less than 1 percent.
[3] Includes low- and medium-temperature and gashouse coke.
[4] Bureau of Mines not at liberty to publish U.S. figure separately.
[5] Data not available.

(Compiled by Augusta W. Jann and Berenice B. Mitchell, Foreign Statistics, Division of Foreign Activities, Bureau of Mines, August 12, 1960.)

Digitized by Google

On a continental basis, Europe, including the U.S.S.R., continued to produce the largest share of the world's coal output, accounting for 61.7 percent of the total (63.8 percent in 1958). Asia, excluding the U.S.S.R., raised its relative position in the world total from 16.1 percent in 1958 to almost 19 percent. Production in North America was virtually the same as in 1958; owing to the increase in total world production, however, its percentage relationship declined from 16.5 percent in 1958 to 16.0 percent. Africa's output failed to meet the 1958 level by about 688,000 tons, and Oceania reported an increase of 1.2 million tons, all comprised of Australian lignite.

Production losses continued in the coal industry of Western Europe in 1959. The lower output in that area was influenced largely by a decline in industrial activity in 1958 and rapid development in the consumption of fuel oil. Conversely, coal production in the Soviet bloc countries, except Czechoslovakia and East Germany, indicated upward trends.

Production in the countries belonging to the Organization for European Economic Cooperation is summarized in table 32. Increases were reported in petroleum, whereas decreases were reported in coal.

TABLE 32.—Monthly average of production of mineral fuels and products in selected OEEC countries, 1952–59 [1]

(Million metric tons)

Product	Member countries combined	Austria	Belgium	France	Saar	West Germany
Black coal:						
1952	40.50	(2)	2.53	4.61	1.35	10.27
1953	40.20	(2)	2.51	4.38	1.37	10.37
1954	40.60	(2)	2.44	4.53	1.40	10.67
1955	40.70	(2)	2.50	4.61	1.44	10.89
1956	41.10	(2)	2.46	4.59	1.42	11.20
1957	41.20	(2)	2.42	4.73	1.37	11.10
1958	40.50	(2)	2.26	4.81	1.36	11.05
1959	38.60	(2)	1.90	4.80	1.34	10.47
Coking coal:						
1952	6.78	0.13	.53	.79	.33	3.11
1953	6.74	.13	.50	.74	.31	3.15
1954	6.65	.14	.51	.79	.31	2.92
1955	7.42	.15	.55	.92	.34	3.39
1956	8.07	.17	.61	1.04	.35	3.63
1957	8.37	.18	.60	1.07	.37	3.78
1958	7.98	----------	.58	1.06	.36	3.63
1959	7.55	----------	.60	1.12	.36	3.21
Crude petroleum:						
1952	.48	.23	----------	.03	----------	.15
1953	.54	.25	----------	.03	----------	.18
1954	.63	.28	----------	.04	----------	.22
1955	.76	.31	----------	.07	----------	.26
1956	.85	.29	----------	.11	----------	.29
1957	.97	.27	----------	.12	----------	.33
1958	1.01	.24	----------	.12	----------	.37
1959	1.10	.21	----------	.14	----------	.43
Petroleum products: [3]						
1952	17.07	[4] .22	.61	5.03	----------	1.22
1953	19.39	[4] .26	.75	5.21	----------	1.49
1954	22.32	[4] .32	.88	5.46	----------	1.97
1955	23.91	.51	1.10	5.74	----------	2.31
1956	25.88	.49	1.28	6.17	----------	2.59
1957	25.74	.50	1.27	5.70	----------	2.69
1958	31.04	.44	1.56	6.84	----------	3.47
1959	32.69	.45	n.a.	6.98	----------	4.96

See footnotes at end of table.

Digitized by Google

TABLE 32.—Monthly average of production of mineral fuels and products in selected OEEC countries, 1952–59—Continued

(Million metric tons)

Product	Italy	Netherlands	Turkey	United Kingdom	Other member countries
Black coal:					
1952	0.09	1.04	0.25	19.17	0.13
1953	.09	1.03	.31	18.98	.13
1954	.09	1.01	.31	18.97	.12
1955	.10	.99	.29	18.76	.12
1956	.09	.99	.31	18.80	.12
1957	.09	.95	.33	18.93	.13
1958	.06	.99	.34	18.27	.13
1959	.06	1.00	.33	17.45	.12
Coking coal:					
1952	.20	.27	(2)	1.45	.09
1953	.20	.27	(2)	1.48	.09
1954	.22	.28	(2)	1.52	.10
1955	.25	.33	(2)	1.53	.12
1956	.28	.35	(2)	1.66	.13
1957	.31	.35	(2)	1.73	.16
1958	.28	.34	(2)	1.56	.17
1959	.27	.34	(2)	1.44	----------
Crude petroleum:					
1952	.01	.06	(4)	----------	----------
1953	.01	.07	(4)	----------	----------
1954	.01	.08	.01	----------	----------
1955	.02	.09	.02	----------	----------
1956	.05	.09	.03	----------	----------
1957	.11	.13	.03	----------	----------
1958	.13	.14	.03	----------	----------
1959	.14	.15	.03	----------	----------
Petroleum products:[5]					
1952	2.29	1.83	----------	5.41	.46
1953	2.99	2.16	----------	6.09	.44
1954	3.76	2.60	----------	6.68	.65
1955	4.02	2.97	.02	6.52	.72
1956	4.43	3.36	.07	6.76	.73
1957	4.79	3.52	.07	6.39	.81
1958	5.63	3.62	.08	7.56	1.84
1959	6.17	3.75	.09	8.97	1.32

[1] General Statistics, OEEC Statistical Bulletins, January 1960, No. 1, and May 1960, No. 3, p. 34, 12, 14, 16. Production of brown coal not reported.
[2] Included in other countries.
[3] Not available.
[4] Less than 0.005 million metric tons.
[5] Production data for petroleum products reflect quarterly rather than monthly averages.
[6] Refined for Austrian account.

TABLE 33.—World-trade price indexes, 1953–59 [1]

(1953=100)

Mineral	1959	1958	1957	1956	1955	1954	1953
Crude petroleum:							
Kuwait	103.0	112.8	109.8	104.9	104.9	104.9	100.0
Saudi Arabia	106.1	114.9	113.3	106.6	106.6	106.6	100.0
United Kingdom	85.4	94.2	108.2	[2] 98.8	86.9	85.4	100.0
United States:							
West-Texas Sour	107.9	114.2	114.2	104.3	104.3	104.3	100.0
Refugio-Light	109.8	113.2	118.2	104.7	104.7	104.7	100.0
Saudi Arabian	95.3	104.4	115.5	107.3	96.2	94.7	100.0
Venezuelan	100.0	108.2	110.1	101.6	101.3	101.3	100.0
Venezuela:							
Export price f.o.b. Puerta La Cruz	102.9	110.5	110.1	101.4	104.0	104.3	100.0
Export price f.o.b. Amuay	104.0	113.3	112.9	102.2	102.2	102.2	100.0
Petroleum products:							
United Kingdom	116.4	114.7	135.0	111.1	101.3	99.5	100.0
U.S. distillate No. 2	107.4	104.9	118.5	109.9	106.2	102.5	100.0
U.S. gasoline	88.6	88.6	95.6	91.2	[2] 92.1	90.4	100.0
Coal:							
Canada	110.7	110.7	109.1	104.1	97.5	97.5	100.0
Germany	117.7	117.7	112.1	105.6	99.4	97.9	100.0
United Kingdom	90.9	112.7	140.0	129.1	99.1	96.4	100.0
United States	108.6	112.3	115.6	105.6	94.2	93.8	100.0

[1] United Nations, Monthly Bulletin of Statistics, March 1960, table 48.
[2] Revised figure.

Digitized by Google

World Trade Prices.—Price indexes of crude petroleum in world trade were down, but prices of petroleum products in consuming areas were unchanged or slightly up. Prices of coal were unchanged in Canada and Germany but were down in the United States and United Kingdom.

GOVERNMENT ACTIVITIES

Oil-Import Program.—As a result of increased imports of crude petroleum and products in late 1958 and early 1959 under the Voluntary Oil-Import Program, the President, upon a finding that such imports threatened to impair the national security, issued Proclamation 3279 on March 10, 1959, which established a mandatory program for adjusting imports of petroleum and petroleum products into the United States. The latter program (1) established a maximum level of imports in Districts I–IV of crude oil, unfinished oils, and finished products, except residual fuel oil, at 9 percent of total demand, (2) limited imports of residual fuel oil into Districts I–IV to the level of 1957 and (3) limited imports of crude oil, unfinished oils, and finished products into District V to an amount that, when added to domestic production and supply, would approximate total demand.

Mine-Water Control.—By the end of 1959, 13 projects had been completed under the Federal-State Mine-Water Control Program established in 1955 by the Federal Government and the Commonwealth of Pennsylvania. Nine others were either under construction or being tested and inspected for final acceptance. Ten of the projects required a total of 29 deep-well pumps, with an aggregate capacity of 143,000 gallons per minute, and the remainder included such work as backfilling old strip pits, constructing ditches and flumes, and sealing surface openings. The 22 projects involved the expenditure of approximately $7.2 million, shared equally by the Federal and State Governments.

During 1959, five projects, costing $1.1 million, were approved by the Secretary of the Interior; one, a pumping installation, subsequently was withdrawn. Of the remaining approved projects, three entailed surface-drainage improvements and other pumping equipment.

Digitized by Google

Employment and Injuries in the Fuel Industries

By John C. Machisak[1]

Contents

	Page		Page
Introduction	33	Oil and gas	36
Coal	33	Peat	37
Coke	35	Conclusion	37

INTRODUCTION

THIS chapter of the Minerals Yearbook contains injury experience and related employment data for the coal-mining, coking, oil and gas, and peat industries of the United States for 1959. Injury experience is measured by the number of injuries per million man-hours of exposure to the hazards of the particular industry.

No attempt has been made to combine these data and present rates reflecting an overall experience for the fuels section of the mineral industries because the various hazards to which employees are exposed in each of the four industries are not comparable. Analytical tabulations pertaining to the trend of the injuries and employment for all mineral industries are shown separately in volume III of the Minerals Yearbook, 1959, in combined form for ready comparison.

COAL

The injury-frequency rate for the coal-mining industry of the United States was more favorable in 1959 than in the previous year, according to reports received by the Bureau of Mines. Preliminary information on bituminous-coal and lignite mines and final information on anthracite mines revealed a combined (fatal and nonfatal) rate of 44.09, a decrease of 2 percent from the previous year and the lowest since 1930, when man-hours of worktime and nonfatal injuries first were collected by the Bureau of Mines.

The number of fatal injuries reported by the industry was the lowest ever recorded by the Bureau. A decrease of 18 percent was noted in the number of fatalities reported, and frequency of occurrence declined 12 percent from 1958. Two major disasters (a disaster is a single accident resulting in the death of five men or more) occurred in the Nation's coal-mining industry in 1959. A disaster in the bituminous-coal industry claimed the lives of 9 men, and 12 men lost their lives in one disaster in the anthracite industry.

[1] Chief, Branch of Accident Analysis.

Digitized by Google

Nonfatal injuries declined 9 percent from 1958 making 1959 the best year since statistics were first recorded by the Bureau.

The average working force of the coal industry declined 12 percent, and man-hours declined 8 percent from 1958. Employees worked an average of 7.85 hours a day for 192 days during the year and accumulated 297.5 million man-hours of worktime.

Bituminous-Coal Mines.—Preliminary information for 1959 indicated the combined fatal and nonfatal rate for the bituminous-coal and lignite industry was more favorable than in the preceding year.

Of the 245 fatalities recorded by the bituminous-coal and lignite industry, 209 occurred underground, 17 at surface operations, and 19 at stripping operations. Auger mines were fatality free in 1959.

Falls of roof, face, and rib—the leading cause of fatal injuries in the bituminous-coal mining industry—claimed the lives of 134 men in 1959, 23 less than in 1958. Haulage ranked second in fatal injuries and caused 35 fatalities underground in 1959, a decrease of 8 from 1958.

The average number of men working daily in the bituminous-coal industry declined 12 percent from the average employment in 1958, resulting in the lowest number of men working since 1910, when records were first available. Employees worked an average of 7.92 hours a day for 194 days during the year, an increase of 11 over the number of days worked in 1958. Total man-hours worked decreased 7 percent in 1959, resulting in an average work year of 1,540 hours per man.

Anthracite Mines.—The injury rate per million man-hours (fatal and nonfatal) at Pennsylvania anthracite mines declined less than 1 percent in 1959. The number of fatalities and the frequency of their occurrence increased 47 and 78 percent, respectively, over the previous

TABLE 1.—Employment and injury experience at coal mines in the United States, 1955–59

Industry and year	Average men working daily [1]	Average active mine days [2]	Man-days worked (thousand) [3]	Man-hours worked (thousand) [3]	Number of injuries		Injury rate per million man-hours
					Fatal	Nonfatal	
Bituminous-coal mines: [4]							
1955	225,539	210	47,306	373,384	360	15,966	43.72
1956	227,778	212	48,392	383,442	392	16,496	44.02
1957	223,900	206	46,020	363,896	427	15,915	44.91
1958	198,350	183	36,260	286,758	326	12,036	43.11
1959 [5]	174,100	194	33,838	268,090	245	11,100	42.32
Anthracite mines:							
1955	34,550	182	6,285	45,995	60	2,919	64.77
1956	32,507	212	6,893	50,220	56	3,330	67.42
1957	30,825	196	6,057	44,311	51	2,877	66.06
1958	26,540	183	4,861	35,471	32	2,124	60.78
1959	23,294	173	4,036	29,371	47	1,723	60.26
Total coal mines:							
1955	260,089	206	53,591	419,379	420	18,885	46.03
1956	260,285	212	55,286	433,662	448	19,816	46.73
1957	254,725	204	52,077	408,207	478	18,792	47.21
1958	224,890	183	41,121	322,229	358	14,160	45.05
1959 [5]	197,394	192	37,874	297,461	292	12,823	44.09

[1] Average number of men at work each day mine was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than number of men available for work, as measured by a count of names on payroll.

[2] Average in which operating time of each mine is weighted by average number of workers in mines.

[3] Man-days and man-hours of employment have been rounded to the nearest thousand and will not necessarily add to published totals.

[4] Includes lignite.

[5] Bituminous data for 1959 are preliminary.

Digitized by Google

year. On the other hand, nonfatal injuries in 1959 were lower in both number and frequency—19 and 2 percent, respectively.

During 1959, 47 employees of anthracite mines died as a result of work accidents which are distributed by general work location—41 underground, 5 at surface operations in connection with underground mines, and 1 in a strip pit. Of the 47 fatalities, 41 (93 percent) occurred underground; 18 of these fatal underground injuries were caused by falls of roof, face, or rib; 12 by an inrush of water; and 8 were haulage accidents. The inrush of water killed 12 men January 22, 1959, in Luzerne County, Pa.

The average number of men working daily and total man-hours decreased 12 and 17 percent, respectively, from 1958. The number of active days declined from 183 in 1958 to 173 in 1959; the average workday declined from 7.30 to 7.28 hours, and the workyear declined from 1,337 to 1,261 hours.

COKE

A record low of three fatal injuries occurred in the coke industry in 1959, according to reports received by the Bureau of Mines, although the nonfatal injuries increased 6 percent in number and 10 percent in frequency of occurrence. The rise in the frequency rate over 1958 was not entirely due to an increase of injuries, as there was a 4-percent decrease in man-hours of worktime.

An increase of 8 percent in active ovens was reported in 1959 over the preceding year, and men on the payroll increased 3 percent; however, a period of 116 days in which most of the coke ovens affiliated with steel plants were operating below normal capacity or were merely in standby status reduced total productive worktime. The annual average hours per employee decreased from 2,810 in 1958 to 2,621;

TABLE 2.—Employment and injury experience at coke ovens in the United States, 1955–59 [1]

Industry and year	Average men working daily [2]	Average active plant days [3]	Man-days worked (thousand) [4]	Man-hours worked (thousand) [4]	Number of injuries		Injury rate per million man-hours
					Fatal	Nonfatal	
Slot-type coke ovens:							
1955	19,597	362	7,085	56,710	9	280	5.10
1956	19,318	355	6,854	54,857	10	268	5.07
1957	19,203	364	6,969	55,859	12	197	3.74
1958	15,654	359	5,616	44,970	5	190	4.34
1959	15,865	337	5,354	42,782	3	183	4.35
Beehive-coke ovens:							
1955	1,084	179	195	1,453	----------	45	30.96
1956	1,155	197	228	1,700	----------	33	19.41
1957	1,061	186	198	1,478	----------	47	31.80
1958	532	125	67	516	----------	20	38.76
1959	780	145	113	844	----------	39	46.20
All coke ovens:							
1955	20,681	352	7,279	58,164	9	325	5.74
1956	20,473	346	7,082	56,557	10	301	5.50
1957	20,264	355	7,187	57,337	12	244	4.46
1958	16,186	351	5,683	45,486	5	210	4.73
1959	16,645	328	5,467	43,626	3	222	5.16

[1] All data are final.
[2] Average number of men at work each day oven was active. Because absenteeism and labor turnover are taken into consideration, this number is lower than the number of men available for work, as measured by a count of names on payroll.
[3] Average in which operating time of each plant is weighted by average number of workers in the plant.
[4] Man-days and man-hours of employment have been rounded to the nearest thousand and will not necessarily add to published totals.

Digitized by Google

and although each employee worked an average shift of 8 hours, he worked 23 days less than in 1958.

Slot-Type Ovens.—The three fatalities reported in the coke industry occurred at slot-type ovens, as did 82 percent of the nonfatal injuries, although the combined frequency rate (fatal and nonfatal) increased less than 1 percent. Average employment increased 1 percent and production 3 percent; and although the hours of worktime decreased 5 percent from 1958, the men averaged 2,697 hours each, with shifts working the customary 8 hours. Men at slot-type ovens worked 22 days less during 1959 than in 1958.

Beehive-Coke Ovens.—The beehive-coke industry operated in 1959 for the seventh consecutive year without a fatality, but nonfatal injuries increased 95 percent. Employment, man-days, and man-hours increased 47, 70, and 64 percent, respectively, and production rose 75 percent. Work shifts were shorter in this segment of the industry (7½ hours), but the men worked 20 days more than in 1958, and the average hours worked for each man per year increased 12 percent.

OIL AND GAS

In 1959, injuries in the oil and gas industry decreased 9 percent in number and 7 percent in frequency from 1958, but the severity of these same injuries increased 7 percent in the number of days lost per million man-hours of exposure.

The nonfatal injuries consisted of 463 permanent partial and 10,080 temporary total injuries, with an average time-loss charge of 45 days. However, when the fatalities and permanent total injuries, each with a time-loss charge of 6,000 days, were added to the first two categories, the time-loss charge increased from 97 days in 1958 to 112.

Only three segments of the industry showed no improvement over 1958 in injury occurrence. They were: pipeline gas, marine transportation (ocean and coastwise), and marketing. Severity of injuries was less in the following: Production, pipeline oil, marine transportation (inland waters), refining, and miscellaneous. Both the frequency rate and the severity rate for the industry as a whole were exceeded in 1959 in three segments of the industry—drilling, production, and marine transportation (ocean and coastwise).

Employment and accumulated man-hours of worktime decreased 4 and 3 percent, respectively; and workers averaged 2,119 hours each, an increase of 40 hours over 1958.

TABLE 3.—Employment and injury experience in the oil and gas industry of the United States, 1955–59

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries		Injury rate per million man-hours
			Fatal [1]	Nonfatal	
1955	617,274	1,303,014	135	13,038	10.11
1956	585,486	1,235,555	147	11,372	9.32
1957	617,596	1,293,725	121	11,426	8.93
1958	584,708	1,215,722	116	11,588	9.63
1959	559,244	1,185,146	120	10,543	9.00

[1] Fatal and permanent total injuries combined.

Digitized by Google

PEAT

The injury-frequency rate for the industrial extracting and processing of peat increased 19 percent per million man-hours of exposure in 1959. A fatality was recorded for the first time in the 3 years that the peat canvass has been conducted by the Bureau of Mines. The number of disabling work injuries in 1959 increased 25 percent over the previous year. Reports were received from 94 active operations in 19 producing States, and showed an increase of 33 (54 percent) over the preceding year.

An average of 467 employees worked 1,580 hours each during the year for a total of 0.7 million man-hours.

TABLE 4.—Employment and injury experience in the peat industry in the United States, 1957–59

Year	Average men working daily	Man-hours worked (thousand)	Number of injuries		Injury rate per million man-hours
			Fatal	Nonfatal	
1957 [1]	139	231	----	5	21.68
1958	464	704	----	12	17.05
1959	467	738	1	14	20.33

[1] Incomplete return—first year of canvass.

CONCLUSION

The overall injury experience improved in two industries (coal mining and oil and gas) but climbed in the coking and peat industries. Coke reported the lowest number of fatalities on record, but this was offset by a 6-percent increase in nonfatal injuries from the previous year. Peat reported the first fatality in 3 years of submitting data, as well as an increase in the number of nonfatal injuries. The frequency of injuries per million man-hours in the coal mining and the oil and gas industries decreased 2 and 7 percent, respectively, from 1958.

Digitized by Google

Digitized by Google

PART II. COMMODITY REVIEWS

A. Coal and Related Products

Coal—Bituminous and Lignite

By W. H. Young,[1] R. L. Anderson,[2] and E. M. Hall[3]

Contents

	Page		Page
General summary	39	Domestic production—Con.	
Scope of report	40	Mechanical crushing	97
Reserves	42	Treatment for allaying dust	99
Thickness of bituminous coal and lignite seams	43	Thermal drying	102
Domestic production	46	Production by States and counties	104
Production by months and weeks	49	Transportation	114
Summary by States	55	Consumption	118
Number and size of mines	58	Relative rate of growth of mineral fuels and waterpower	122
Employment and productivity	61	Stocks	122
Underground mining	63	Prices	123
Strip mining	68	Lignite	125
Auger mining	82	Foreign trade	126
Mechanical loading	85	World production	130
Mechanical cleaning	93	Coal technology	132

GENERAL SUMMARY

THE DOMESTIC bituminous coal and lignite industry remained fairly steady in 1959 compared with 1958. Although mechanization continued to expand and production increased slightly, consumption, average value, exports, and employment decreased. The percentage of underground production mechanically loaded, the percentage of total production mined by stripping, and tonnage per man per day were at their highest levels.

Production.—The output of bituminous coal and lignite in 1959—412 million tons—was 0.4 percent greater than the 410.4 million tons produced in 1958. Production was retarded in 1959, largely owing to the steel strike and reduced exports.

The major seasonal fluctuation in production, as in the past, resulted from the miners' vacation period of 12 days in midsummer. However, the 4-month steel strike, July to October, reduced production considerably. According to the Bureau of Labor Statistics, U.S. Department of Labor, time lost because of strikes totaled 1,560,000 man-days in 1959 compared with 102,000 in 1958.

Trend of Employment.—Employment decreased 9 percent in 1959 compared with 1958.

[1] Chief, Bituminous Coal and Lignite Section.
[2] Supervising commodity industrial analyst.
[3] Supervising statistical assistant.

Digitized by Google

Index to Capacity.—As it is impossible for all mines to operate every working day in the year, an estimate of 280 days for calculating potential capacity was suggested some years ago by the coal committee of the American Institute of Mining, Metallurgical and Petroleum Engineers. The average output per day worked in 1959 was 2.2 million tons, which, if applied to 280 days, gives an annual potential output of 614 million tons, compared with the actual production of 412 million tons.

Mechanization.—A larger proportion—86 percent—of the coal output was loaded mechanically at underground mines in the United States in 1959 than in 1958. Strip mines also furnished more of the production in 1959 than in 1958.

Mechanical Cleaning.—Approximately 66 percent of the bituminous coal and lignite mined in the United States in 1959 was mechanically cleaned. The growth of mechanical cleaning has closely paralleled that of mechanical mining, which requires more mechanical cleaning partly because more refuse is loaded with the coal. Moreover, the bituminous coal and lignite industry has attempted to meet the consumer demand for cleaner coal. A large part of the remaining 34 percent was handpicked and screened into various sizes at tipples with no mechanical cleaning facilities.

Consumption.—Consumption of bituminous coal and lignite in the United States decreased 0.1 percent. The principal increase in 1959 was registered by the electric-power utilities, whereas other manufacturing and mining industries showed the largest decrease. Retail deliveries also declined.

Trends of Fuel Efficiency.—As in many preceding years, electric-power utilities scored new records in fuel efficiency.

Competition with Oil and Gas.—Although consumption of energy has increased steadily since 1920, the proportion supplied by bituminous coal and lignite has decreased consistently as a result of serious competition from oil and gas. Of total energy consumed in 1959, bituminous coal and lignite furnished 22 percent; anthracite, 1 percent; oil, 43 percent; gas, 30 percent; and waterpower, 4 percent.

Electric utilities consumed 8 percent more bituminous coal, 19 percent more gas, and 14 percent more fuel oil in 1959.

Class I railroads decreased their consumption of coal 30 percent and increased their purchases of fuel oil and diesel fuel 4 percent.

Stocks.—The reserve supply of bituminous coal and lignite in the hands of industrial consumers and retail coalyards was approximately 76 million tons at the beginning and end of 1959. Stocks decreased from a 65- to a 64-day supply. Stocks on the upper lake docks decreased 526,002 tons from January 1 to December 31, 1959.

Exports.—In 1959 exports totaled 37 million tons, decreasing 26 percent from 1958; 25 million tons was shipped overseas and 12 million tons to Canada.

SCOPE OF REPORT

These data include all coal produced in the United States except Pennsylvania anthracite and Texas lignite.

Throughout the chapter all tonnage figures show net tons of marketable coal and exclude washery and other refuse. "Tons" refers to net short tons of 2,000 pounds.

Digitized by Google

TABLE 1.—Salient statistics of the bituminous coal and lignite industry in the United States, 1958–59

Item	1958	1959	Change from 1958 (percent)
Production ..... net tons	410,445,547	412,027,502	+0.4
Consumption in the United States ..... do	366,703,000	366,256,000	−.1
Stocks at end of year:			
Industrial consumers and retail yards ..... do	76,285,000	76,202,000	−.1
Stocks on upper lake docks ..... do	3,978,680	3,452,678	−13.2
Imports and exports: [1]			
Imports ..... do	306,940	374,713	+22.1
Exports ..... do	50,279,706	37,226,766	−26.0
Price indicators (average per net ton):			
Average cost of railroad fuel purchased, f.o.b. mines [2]	$5.64	$5.63	−.2
Average cost of coking coal at merchant coke ovens	$10.74	$10.49	−2.3
Average retail price [3]	$16.53	$16.89	+2.2
Average railroad freight charge per net ton [2]	$3.58	$3.45	−3.6
Average value f.o.b. mines	$4.86	$4.77	−1.9
Equipment sold:			
Mobile loading machines	97	95	−2.1
Continuous mining machines	107	140	+30.8
Augers	42	47	+11.9
Shuttle cars	181	233	+28.7
Conveyors:			
Gathering and haulage	97	118	+21.6
Room and transfer	92	65	−29.3
Method of mining:			
Hand loaded underground ..... net tons	43,311,157	39,702,471	−8.3
Mechanically loaded underground ..... do	243,573,087	243,731,184	+.1
Percentage of total underground production mechanically loaded	84.9	86.0	+1.3
Mined by stripping ..... net tons	116,241,787	120,953,334	+4.1
Mined at auger mines ..... do	7,319,516	7,640,513	+4.4
Mechanically cleaned ..... do	259,034,851	269,786,687	+4.2
Number of mines	8,264	7,719	−6.6
Average number of days worked [4]	184	188	+2.2
Average number of men working daily [4]	197,402	179,636	−9.0
Production per man per day [4] ..... net tons	11.33	12.22	+7.9
Fuel efficiency indicator: Pounds of coal per kilowatt-hour at electric powerplants [5]	.90	.89	−1.1

[1] Bureau of the Census, U.S. Department of Commerce.
[2] Interstate Commerce Commission.
[3] Bureau of Labor Statistics, U.S. Department of Labor.
[4] Accident Analysis Branch, Federal Bureau of Mines.
[5] Federal Power Commission.

Statistics for 1959 are final and are based upon detailed annual reports of production and mine operation furnished by producers. All but a small percentage of the output was covered by the reports submitted. For production not directly reported (chiefly that of small mines), accurate data were obtained from the records of the various State mine departments (which have statutory authority to require such reports) or, in a few instances, from railroad carloadings. Thus, complete coverage of all mines producing 1,000 tons a year or more is reported. Inclusion of many small mines that produce less than 1,000 tons a year was not attempted.

From 1955 to 1959 the annual production form did not request information on employment. These figures that include men working daily, days worked, man-days worked, and tons per man per day were obtained from the Accident Analysis Branch of the Bureau of Mines.

Statistical procedures are also detailed in the following sections: Production by Months and Weeks, Number and Size of Mines, Mechanical Cleaning, Production by States and Counties, Consumption, Relative Rate of Growth of Mineral Fuels and Waterpower, and Stocks.

569112—60——4

Digitized by Google

RESERVES

TABLE 2.—Coal reserves of the United States, January 1, 1959, by States [1]

(In million short tons)

State	Estimated original reserves					Reserves depleted to January 1, 1959		Remaining reserves, Jan 1, 1959.	Recoverable reserves Jan. 1, 1959, assuming 50-percent recovery
	Bituminous coal	Subbituminous coal	Lignite	Anthracite and semi-anthracite	Total	Cumulative production	Production plus loss in mining		
Alabama	67,570				67,570	934	1,868	65,702	32,851
Arkansas	1,396		90	230	1,716	99	198	1,518	759
COLORADO	63,203	18,492		90	81,785	503	1,006	80,779	40,389
GEORGIA	100				100	12	24	76	38
ILLINOIS	137,321				137,321	429	858	136,463	68,232
INDIANA	37,293				37,293	1,132	2,264	35,029	17,514
Iowa	29,160				29,160	356	712	28,448	14,224
KANSAS	20,774				20,774	12	24	20,750	10,375
KENTUCKY	72,318				72,318	2,579	5,158	67,160	33,580
MARYLAND	1,200				1,200	5	10	1,190	595
MICHIGAN	297				297	46	92	205	103
Missouri	79,362				79,362	285	570	78,792	39,396
MONTANA	2,363	132,151	87,533		222,047	170	340	221,707	110,853
NEW MEXICO	10,948	50,801		6	61,755	125	250	61,505	30,753
NORTH CAROLINA	112				112	1	2	110	55
NORTH DAKOTA			350,910		350,910	94	188	350,722	175,361
OHIO	43,844				43,844	2,018	4,036	39,808	19,904
OKLAHOMA	3,673				3,673	178	356	3,317	1,658
PENNSYLVANIA	75,093			22,805	97,898	13,418	26,836	71,062	35,531
SOUTH DAKOTA			2,033		2,033	1	2	2,031	1,016
Tennessee	25,665				25,665	383	766	24,899	12,449
Texas	8,000		7,070		15,070	93	186	14,884	7,442
Utah	88,184	5,156			93,340	254	508	92,832	46,416
VIRGINIA	11,696			355	12,051	754	1,508	10,543	5,272
Washington	11,413	52,442		23	63,878	148	296	63,582	31,791
WEST VIRGINIA	116,618				116,618	6,248	12,496	104,122	52,061
WYOMING	13,235	108,319			121,554	400	800	120,754	60,377
Other States	780	15,180	50		16,010	9	18	15,992	7,996
Total (except Alaska)	921,618	382,541	447,686	23,509	1,775,354	30,686	61,372	1,713,982	856,991
ALASKA	23,800	82,594		1,000	107,394	12	24	107,370	53,685
Total (including Alaska)	945,418	465,135	447,686	24,509	1,882,748	30,698	61,396	1,821,352	910,676

[1] Averitt, Paul, Berryhill, Louise R., and Taylor, Dorothy A., Coal Resources of the United States: Geol. Survey Circ. 293, 1954, p. 5. (Revised by new original reserve estimates for Colorado, Kentucky, Ohio, Oklahoma, Oregon, and Texas lignite, and with production and recoverable reserve data updated from 1952 on the basis of Bureau of Mines production figures for the period 1953–58. Estimates for States printed in capital letters may exclude portions of the State where adequate information is lacking. Detailed footnotes appear in Circ. 293.)

Digitized by Google

THICKNESS OF BITUMINOUS COAL AND LIGNITE SEAMS

The Bureau of Mines compiled and published detailed data on thickness of seams for coal mines in 1955.[4] Because of the importance of seam thickness in mining, these data for 1955 follow. See also figure 1.

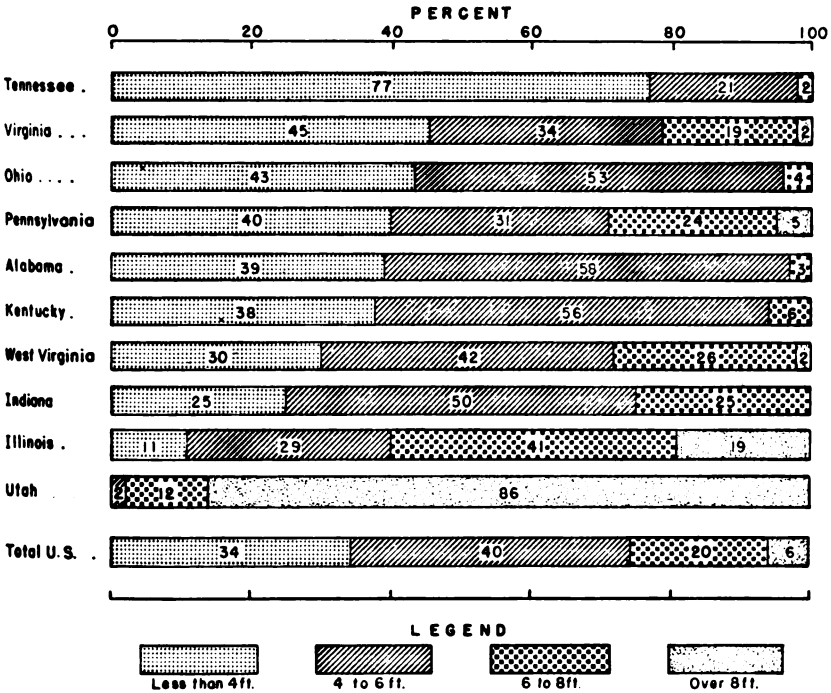

FIGURE 1.—Percentage of bituminous coal and lignite produced in the 10 leading coal-producing States and total United States, 1955, by thickness of seams mined.

[4] Young, W. H., and Anderson, R. L., Thickness of Bituminous-Coal and Lignite Seams at All Mines, and Thickness of Overburden at Strip Mines in the United States in 1955: Bureau of Mines Inf. Circ. 7812, 1957, 11 pp.

Digitized by Google

TABLE 3.—Number and production of bituminous coal and lignite mines in the United States, 1955, classified by thickness of seams mined

Item	Less than 2 feet	2 to 3 feet	3 to 4 feet	4 to 5 feet	5 to 6 feet	6 to 7 feet	7 to 8 feet	8 feet and over	Total
Number of mines:									
Underground	32	1,289	2,467	1,243	438	251	152	163	6,035
Strip	117	484	503	267	113	47	23	63	1,617
Auger	--------	35	78	67	14	7	--------	3	204
Total	149	1,808	3,048	1,577	565	305	175	229	7,856
Percentage of mines:									
Underground	.5	21.4	40.9	20.6	7.2	4.2	2.5	2.7	100.0
Strip	7.3	30.0	31.1	16.5	7.0	2.9	1.4	3.8	100.0
Auger	--------	17.2	38.2	32.8	6.9	3.4	--------	1.5	100.0
Total	1.9	23.0	38.8	20.1	7.2	3.9	2.2	2.9	100.0
Production (thousand tons):									
Underground	269	17,610	81,934	69,650	65,621	50,397	35,107	22,877	343,465
Strip	4,232	19,303	31,516	29,016	17,579	5,923	1,077	6,447	115,093
Auger	--------	423	1,627	2,774	661	525	--------	65	6,075
Total	4,501	37,336	115,077	101,440	83,861	56,845	36,184	29,389	464,633
Percentage of production:									
Underground	.1	5.1	23.9	20.2	19.1	14.7	10.2	6.7	100.0
Strip	3.7	16.8	27.4	25.2	15.2	5.2	.9	5.6	100.0
Auger	--------	7.0	26.8	45.7	10.9	8.6	--------	1.0	100.0
Total	1.0	8.0	24.8	21.8	18.1	12.2	7.8	6.3	100.0

Digitized by Google

TABLE 4.—Number of mines, production, output per man per day, and average thickness of seams mined, at underground, strip, and auger bituminous coal and lignite mines in the United States, by States, in 1955

State	Underground mines				Strip mines				Auger mines				Total, all mines			
	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)	Number of mines	Production (net tons)	Average output per man per day (tons)	Average thickness of seams mined (feet)
Alabama	195	10,970,610	6.25	4.4	39	2,110,979	14.64	3.2	1	6,888	20.00	8.0	235	13,088,477	6.89	4.6
Alaska	6	239,571	5.64	20.7	7	400,125	16.94	23.7					13	639,696	9.68	22.6
Arizona	2	8,898	2.78	5.5									2	8,898	2.78	5.5
Arkansas	19	317,001	4.36	2.6	8	260,725	11.65	1.7					27	577,726	6.08	2.2
Colorado	110	3,211,125	5.84	7.1	7	356,805	24.41	6.2					117	3,567,930	6.32	7.0
Georgia	6	12,471	2.70	1.5									6	12,471	2.70	1.5
Illinois	103	27,256,495	14.23	7.3	68	18,675,619	23.87	4.8					171	45,932,114	17.02	6.3
Indiana	44	4,967,089	10.66	6.2	56	11,182,221	27.14	4.4					100	16,149,310	18.39	5.0
Iowa	30	297,490	4.33	4.5	30	960,867	16.35	3.9					60	1,258,357	9.87	4.1
Kansas	5	14,819	3.17	2.7	19	727,463	11.97	1.6					24	742,282	11.34	1.6
Kentucky	1,852	54,440,144	8.38	4.4	118	13,643,240	25.36	4.8	34	936,526	19.17	4.4	2,004	69,019,910	9.75	4.4
Maryland	58	275,454	3.82	3.8	26	237,015	12.22	4.7					84	512,469	5.60	4.2
Missouri	19	157,103	2.99	3.6	28	3,075,382	20.69	2.5					47	3,232,485	16.06	2.6
Montana (bit. & lig.)	19	439,285	7.95	5.8	5	807,968	67.25	23.5					24	1,247,253	18.54	17.3
New Mexico	28	174,299	3.86	5.8	3	27,280	14.44	6.3					31	201,579	4.28	5.9
North Dakota (lignite)	5	21,357	7.99	10.1	40	3,080,730	35.90	12.1					45	3,102,087	35.06	12.1
Ohio	233	12,632,165	8.47	4.8	259	23,958,329	22.83	3.8	38	1,279,297	35.38	4.1	530	37,869,791	14.70	4.2
Oklahoma	14	694,323	4.57	3.7	21	1,469,213	17.75	2.3					35	2,163,536	9.22	2.8
Pennsylvania	797	64,904,231	7.19	5.5	585	20,518,113	14.99	3.2	29	291,112	13.50	3.0	1,411	85,713,456	8.23	4.9
South Dakota (lignite)					2	25,782	10.31	4.5					2	25,782	10.31	4.5
Tennessee	409	5,340,664	5.72	3.9	87	1,635,052	16.72	2.5	8	77,128	11.62	3.3	504	7,052,844	6.79	3.6
Utah	50	6,295,524	9.75	11.1									50	6,295,524	9.75	11.1
Virginia	1,007	22,241,262	7.19	4.5	31	981,782	13.78	5.0	21	284,465	14.06	4.5	1,059	23,507,509	7.38	4.5
Washington	12	578,076	5.01	7.6	1	31,714	25.66	5.5					13	609,790	5.24	7.5
West Virginia	996	126,588,262	8.86	5.1	168	9,379,643	22.96	5.8	73	3,199,984	22.92	4.7	1,237	139,167,889	9.38	5.1
Wyoming	16	1,387,521	9.35	8.0	8	1,539,072	36.32	33.1					24	2,926,593	15.34	21.2
Total	6,035	343,465,239	8.28	5.3	1,616	115,085,119	21.12	4.9	204	6,075,400	22.22	4.4	7,855	464,625,758	9.84	5.2

Digitized by Google

DOMESTIC PRODUCTION

TABLE 5.—Growth of the bituminous coal and lignite mining industry in the United States, 1890–1959

Year	Production (net tons)	Value of production		Number of mines	Capacity at 220 days (million tons)	Foreign trade [1]	
		Total	Average per ton			Exports (net tons)	Imports (net tons)
1890	111,302,322	$110,420,801	$0.99	(2)	137	1,272,396	1,047,416
1891	117,901,238	117,188,400	.99	(2)	148	1,651,694	1,181,677
1892	126,856,567	125,124,381	.99	(2)	162	1,904,556	1,491,800
1893	128,385,231	122,751,618	.96	(2)	174	1,986,383	1,234,499
1894	118,820,405	107,653,501	.91	(2)	196	2,439,720	1,286,268
1895	135,118,193	115,779,771	.86	2,555	196	2,659,987	1,411,323
1896	137,640,276	114,891,515	.83	2,599	202	2,515,838	1,393,095
1897	147,617,519	119,595,224	.81	2,454	213	2,670,157	1,442,534
1898	166,593,623	132,608,713	.80	2,862	221	3,004,304	1,426,108
1899	193,323,187	167,952,104	.87	3,245	230	3,897,994	1,409,538
1900	212,316,112	220,930,313	1.04	(2)	255	6,060,688	1,911,925
1901	225,828,149	236,422,049	1.05	(2)	281	6,455,085	2,214,507
1902	260,216,844	290,858,483	1.12	(2)	316	6,048,777	2,174,393
1903	282,749,348	351,687,933	1.24	(2)	350	5,835,561	4,043,519
1904	278,659,689	305,397,001	1.10	4,650	386	7,206,879	2,179,882
1905	315,062,785	334,658,294	1.06	5,060	417	7,512,723	1,704,810
1906	342,874,867	381,162,115	1.11	4,430	451	8,014,263	2,039,169
1907	394,759,112	451,214,842	1.14	4,550	473	9,869,812	1,892,653
1908	332,573,944	374,135,268	1.12	4,730	482	11,071,152	2,219,243
1909	379,744,257	405,486,777	1.07	5,775	510	10,101,131	1,375,201
1910	417,111,142	469,281,719	1.12	5,818	538	11,663,052	1,819,766
1911	405,907,059	451,375,819	1.11	5,887	538	13,259,791	1,972,555
1912	450,104,982	517,983,445	1.15	5,747	566	16,475,029	1,456,333
1913	478,435,297	565,234,952	1.18	5,776	577	18,013,073	1,767,656
1914	422,703,970	493,309,244	1.17	5,592	608	17,589,562	1,520,962
1915	442,624,426	502,037,688	1.13	5,502	610	18,776,640	1,703,785
1916	502,519,682	665,116,077	1.32	5,726	613	21,254,627	1,713,837
1917	551,790,563	1,249,272,837	2.26	6,939	636	23,839,558	1,448,453
1918	579,385,820	1,491,809,940	2.58	8,319	650	22,350,730	1,457,073
1919	465,860,058	1,160,616,013	2.49	8,994	669	20,113,536	1,011,560
1920	568,666,683	2,129,933,000	3.75	8,921	725	38,517,084	1,244,990
1921	415,921,950	1,199,983,600	2.89	8,038	781	23,131,166	1,257,589
1922	422,268,099	1,274,820,000	3.02	9,299	832	12,413,085	5,059,999
1923	564,564,662	1,514,621,000	2.68	9,331	885	21,453,579	1,882,306
1924	483,686,538	1,062,626,000	2.20	7,586	792	17,100,347	417,226
1925	520,052,741	1,060,402,000	2.04	7,144	748	17,461,560	601,737
1926	573,366,985	1,183,412,000	2.06	7,177	747	35,271,937	485,666
1927	517,763,352	1,029,657,000	1.99	7,011	759	18,011,744	549,843
1928	500,744,970	933,774,000	1.86	6,450	691	16,164,485	546,526
1929	534,988,593	952,781,000	1.78	6,057	679	17,429,298	495,219
1930	467,526,299	795,483,000	1.70	5,891	700	15,877,407	240,886
1931	382,089,396	588,895,000	1.54	5,642	669	12,126,299	206,303
1932	309,709,872	406,677,000	1.31	5,427	594	8,814,047	186,909
1933	333,630,533	445,788,000	1.34	5,555	559	9,036,947	197,429
1934	359,368,022	628,383,000	1.75	6,258	565	10,868,552	179,661
1935	372,373,122	658,063,000	1.77	6,315	582	9,742,430	201,871
1936	439,087,903	770,955,000	1.76	6,875	618	10,654,959	271,798
1937	445,531,449	864,042,000	1.94	6,548	646	13,144,678	257,996
1938	348,544,764	678,653,000	1.95	5,777	602	10,490,269	241,305
1939	394,855,325	728,348,366	1.84	5,820	621	11,590,478	355,115
1940	460,771,500	879,327,227	1.91	6,324	639	16,465,928	371,571
1941	514,149,245	1,125,362,836	2.19	6,822	666	20,740,471	390,049
1942	582,692,937	1,373,990,608	2.36	6,972	663	22,943,305	498,103
1943	590,177,069	1,584,644,477	2.69	6,620	626	25,836,208	757,634
1944	619,576,240	1,810,900,542	2.92	6,928	624	26,032,348	633,689
1945	577,617,327	1,768,204,320	3.06	7,033	620	27,956,192	467,473
1946	533,922,068	1,835,539,476	3.44	7,333	699	41,197,378	434,680
1947	630,623,722	2,622,634,946	4.16	8,700	755	68,666,963	290,141
1948	599,518,229	2,993,267,021	4.99	9,079	774	45,930,133	291,337
1949	437,868,036	2,136,870,571	4.88	8,559	781	27,842,056	314,980
1950	516,311,053	2,500,373,779	4.84	9,429	790	25,468,403	346,706
1951	533,664,732	2,626,030,137	4.92	8,009	736	56,721,547	292,378
1952	466,840,782	2,289,180,401	4.90	7,275	703	47,643,150	262,268
1953	457,290,449	2,247,828,694	4.92	6,671	670	33,760,263	226,900
1954	391,706,300	1,769,619,723	4.52	6,130	603	31,040,564	198,799
1955	464,633,408	2,092,382,737	4.50	7,856	620	51,277,256	337,145
1956	500,874,077	2,412,004,151	4.82	8,520	655	68,552,629	355,701
1957	492,703,916	2,504,406,042	5.08	8,539	680	76,445,529	366,506
1958	410,445,547	1,996,281,274	4.86	8,264	625	[3] 50,293,382	306,940
1959	412,027,502	1,965,606,901	4.77	7,719	614	37,226,766	374,713

[1] Figures for 1890–1914 represent fiscal year ended June 30. [2] Data not available. [3] Revised figure.

Digitized by Google

TABLE 6.—Growth of the bituminous coal and lignite mining industry in the United States, 1890–1959

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [1]	Mechanically loaded	Mechanically cleaned [2]	Mined by stripping
1890	192,204	226	[3]	2.56	579	[3]	[3]	[3]	[3]
1891	205,803	223	[3]	2.57	573	5.3	[3]	[3]	[3]
1892	212,893	219	[3]	2.72	596	[3]	[3]	[3]	[3]
1893	230,365	204	[3]	2.73	557	[3]	[3]	[3]	[3]
1894	244,603	171	[3]	2.84	486	[3]	[3]	[3]	[3]
1895	239,962	194	[3]	2.90	563	[3]	[3]	[3]	[3]
1896	244,171	192	[3]	2.94	564	11.9	[3]	[3]	[3]
1897	247,817	196	[3]	3.04	596	15.3	[3]	[3]	[3]
1898	255,717	211	[3]	3.09	651	19.5	[3]	[3]	[3]
1899	271,027	234	46	3.05	713	22.7	[3]	[3]	[3]
1900	304,375	234	43	2.98	697	24.9	[3]	[3]	[3]
1901	340,235	225	35	2.94	664	25.6	[3]	[3]	[3]
1902	370,056	230	44	3.06	703	26.8	[3]	[3]	[3]
1903	415,777	225	28	3.02	680	27.6	[3]	[3]	[3]
1904	437,832	202	44	3.15	637	28.2	[3]	[3]	[3]
1905	460,629	211	23	3.24	684	32.8	[3]	[3]	[3]
1906	478,425	213	63	3.36	717	34.7	[3]	2.7	[3]
1907	513,258	234	14	3.29	769	35.1	[3]	2.9	[3]
1908	516,264	193	38	3.34	644	37.0	[3]	3.6	[3]
1909	543,152	209	29	3.34	699	37.5	[3]	3.8	[3]
1910	555,533	217	89	3.46	751	41.7	[3]	3.8	[3]
1911	549,775	211	27	3.50	738	43.9	[3]	[3]	[3]
1912	548,632	223	35	3.68	820	46.8	[3]	3.9	[3]
1913	571,882	232	36	3.61	837	50.7	[3]	4.6	[3]
1914	583,506	195	80	3.71	724	51.8	[3]	4.8	0.3
1915	557,456	203	61	3.91	794	55.3	[3]	4.7	.6
1916	561,102	230	26	3.90	896	56.9	[3]	4.6	.8
1917	603,143	243	17	3.77	915	56.1	[3]	4.6	1.0
1918	615,305	249	7	3.78	942	56.7	[3]	3.8	1.4
1919	621,998	195	37	3.84	749	60.0	[3]	3.6	1.2
1920	639,547	220	22	4.00	881	60.7	[3]	3.3	1.5
1921	663,754	149	23	4.20	627	66.4	[3]	3.4	1.2
1922	687,958	142	117	4.28	609	64.8	[3]	[3]	2.4
1923	704,793	179	20	4.47	801	68.3	0.3	3.8	2.1
1924	619,604	171	73	4.56	781	71.5	.7	[3]	2.8
1925	588,493	195	30	4.52	884	72.9	1.2	[3]	3.2
1926	593,647	215	24	4.50	966	73.8	1.9	[3]	3.0
1927	593,918	191	153	4.55	872	74.9	3.3	5.3	3.6
1928	522,150	203	83	4.73	959	76.9	4.5	5.7	4.0
1929	502,993	219	11	4.85	1,064	78.4	7.4	6.9	3.8
1930	493,202	187	43	5.06	948	81.0	10.5	8.3	4.3
1931	450,213	160	35	5.30	849	83.2	13.1	9.5	5.0
1932	406,380	146	120	5.22	762	84.1	12.3	9.8	6.3
1933	418,703	167	30	4.78	797	84.7	12.0	10.4	5.5
1934	458,011	178	15	4.40	785	84.1	12.2	11.1	5.8
1935	462,403	179	[4] 7	4.50	805	84.2	13.5	12.2	6.4
1936	477,204	199	21	4.62	920	84.8	16.3	13.9	6.4
1937	491,864	193	[4] 19	4.69	906	[3]	20.2	14.6	7.1
1938	441,333	162	13	4.89	790	87.5	26.7	18.2	8.7
1939	421,788	178	36	5.25	936	87.9	31.0	20.1	9.6
1940	439,075	202	8	5.19	1,049	88.4	35.4	22.2	9.2
1941	456,981	216	27	5.20	1,125	89.0	40.7	22.9	10.7
1942	461,991	246	7	5.12	1,261	89.7	45.2	24.4	11.5
1943	416,007	264	[4] 15	5.38	1,419	90.3	48.9	24.7	13.5
1944	393,347	278	[4] 5	5.67	1,575	90.5	52.9	25.6	16.3
1945	383,100	261	[4] 9	5.78	1,508	90.8	56.1	25.6	19.0
1946	[5] 396,434	214	[4] 23	6.30	1,347	90.8	58.4	26.0	21.1
1947	[5] 419,182	234	[4] 5	6.42	1,504	90.0	60.7	27.7	22.1
1948	[5] 441,631	217	[4] 16	6.26	1,358	90.7	64.3	30.2	23.3
1949	[5] 433,698	157	[4] 15	6.43	1,010	91.4	67.0	35.1	24.2

See footnotes at end of table.

Digitized by Google

TABLE 6.—Growth of the bituminous coal and lignite mining industry in the United States, 1890–1959—Continued

Year	Men employed	Average number of days worked	Average days lost per man on strike	Net tons per man—		Percentage of underground production—		Percentage of total production—	
				Per day	Per year	Cut by machines [1]	Mechanically loaded	Mechanically cleaned [2]	Mined by stripping
1950	[5] 415,582	183	[4] 56	6.77	1,239	91.8	69.4	38.5	23.9
1951	[5] 372,897	203	[4] 4	7.04	1,429	93.4	73.1	45.0	22.0
1952	[5] 335,217	186	[4] 6	7.47	1,389	92.8	75.6	48.7	23.3
1953	[5] 293,106	191	[4] 3	8.17	1,560	92.3	79.6	52.9	23.1
1954	[5] 227,397	182	[4] 4	9.47	1,724	88.8	84.0	59.4	25.1
1955	[5] 225,093	210	[4] 4	9.84	2,064	88.1	84.6	58.7	24.8
1956	[5] 228,163	214	[4] 4	10.28	2,195	84.6	84.0	58.4	25.4
1957	[5] 228,635	203	[4] 3	10.59	2,155	80.9	84.8	61.7	25.2
1958	[5] 197,402	184	[4] 3	11.33	2,079	75.3	84.9	63.1	28.3
1959	[5] 179,636	188	[4] 24	12.22	2,294	72.1	86.0	65.5	29.4

[1] Percentages for 1890–1913 are of total production, as a separation of underground and strip production is not available for these years.
[2] Percentages for 1906–26 are exclusive of coal cleaned at central washeries operated by consumers.
[3] Data not available.
[4] Bureau of Labor Statistics, U.S. Department of Labor.
[5] Average number of men working daily.

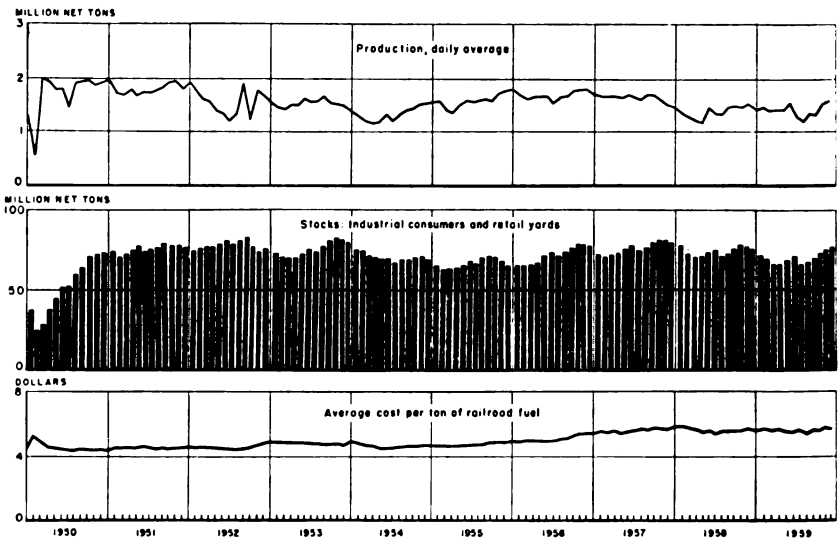

FIGURE 2.—Trends of production, stocks, and railroad-fuel prices of bituminous coal and lignite in the United States, 1950–59.

Digitized by Google

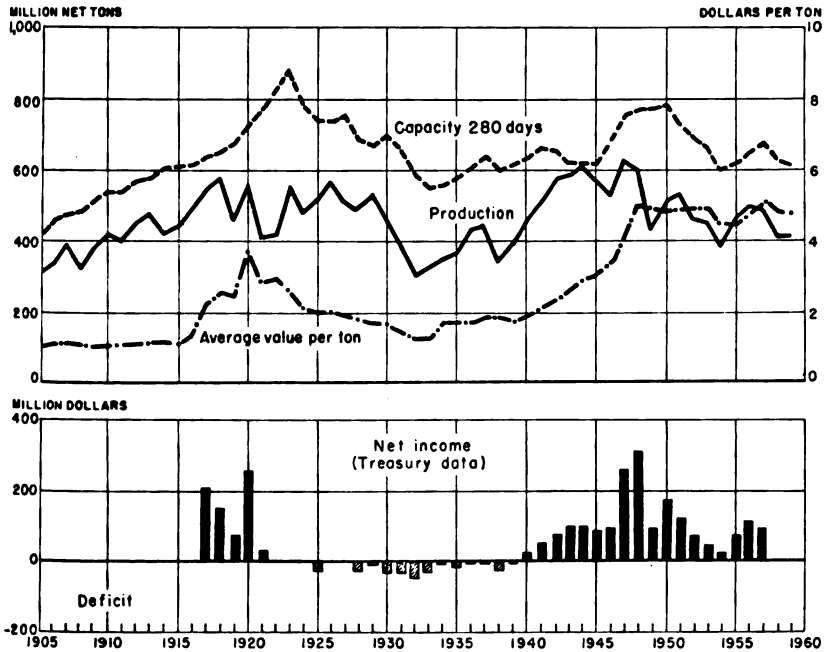

FIGURE 3.—Trends of bituminous coal and lignite production, realization, mine capacity, and net income or deficit in the United States, 1905–59.

PRODUCTION BY MONTHS AND WEEKS

The figures on monthly and weekly production are estimates based upon (1) railroad carloadings of coal reported daily and weekly by all important carriers, (2) shipments on the Allegheny and Monongahela Rivers reported by the U.S. Army Engineers, (3) direct reports from mining companies, and (4) monthly production statements compiled by certain local operators' associations and State mine departments. In computing the estimates, allowance is made for commercial truck shipments, local sales, colliery fuel, and small truck mines producing over 1,000 tons a year. Preliminary estimates are made currently and published in the Weekly Coal Reports. These preliminary estimates have proved very reliable and for many years have been within approximately 1 percent of the final figure of total production, based upon complete coverage of all mines producing over 1,000 tons a year. The preliminary estimates are later revised to agree with the final total production based on the canvass. Thus, the monthly and weekly estimates of production, summarized in tables 7–10, represent final figures and vary slightly from the preliminary figures of production published in the Weekly Coal Reports. See also figures 2, 4, and 5.

Digitized by Google

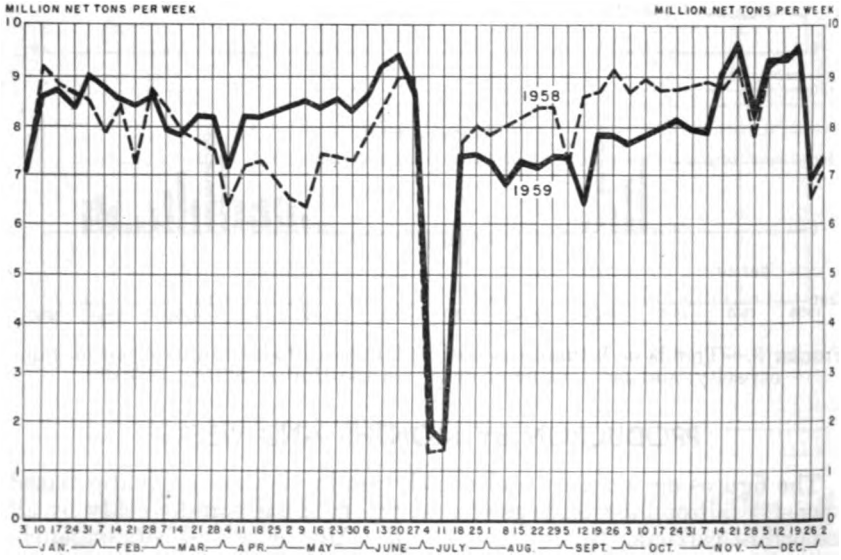

FIGURE 4.—Production of bituminous coal and lignite in the United States, 1958–59, by weeks.

Digitized by Google

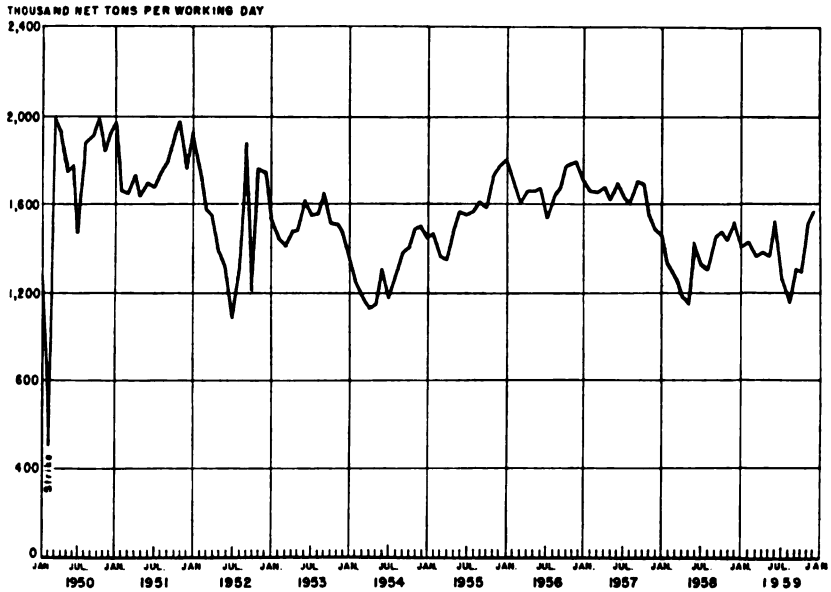

FIGURE 5.—Average production of bituminous coal and lignite in the United States per working day in each month, 1950–59.

TABLE 7.—Production of bituminous coal and lignite in the United States, 1958–59, with estimates by months

Month	Production (thousand net tons)		Maximum number of working days		Average production per working day (thousand net tons)	
	1958	1959	1958	1959	1958	1959
January	38,658	36,485	26	26	1,487	1,403
February	32,237	34,273	24	24	1,343	1,428
March	32,886	35,396	26	26	1,265	1,361
April	30,432	35,096	25.3	25.4	1,203	1,382
May	31,103	35,495	26.6	25.8	1,169	1,376
June	34,647	36,775	23.8	24.1	1,456	1,526
July	24,301	24,377	18	19.4	1,350	1,257
August	34,420	30,088	26	26	1,324	1,157
September	36,956	32,571	25	25	1,478	1,303
October	40,205	34,921	27	27	1,489	1,293
November	34,802	35,997	23.8	23.8	1,462	1,512
December	39,799	40,554	26	26	1,531	1,560
Total	410,446	412,028	297.5	298.5	1,380	1,380

Digitized by Google

TABLE 8.—Production of bituminous coal and lignite in the United States in 1959, by States, with estimates by months, in thousand net tons

[Totals for year are based on final complete returns from all operators known to have produced 1,000 or more tons per year. Monthly apportionment is based on current records of railroad carloadings and shipments on the Allegheny and Monongahela Rivers, supplemented by direct reports from local sources]

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
Alabama	1,141	1,059	1,215	1,162	1,155	1,125	555	762	743	774	954	1,302	11,947
Alaska	82	65	71	55	37	27	33	33	49	65	69	74	660
Arkansas	52	53	46	42	40	32	13	19	21	25	42	56	441
Colorado	377	324	325	273	238	251	84	144	184	267	362	465	3,294
Illinois	4,221	3,575	3,681	3,544	3,529	3,675	2,677	3,677	4,000	4,242	4,222	4,423	45,466
Indiana	1,521	1,350	1,323	1,158	1,055	1,174	732	1,026	1,109	1,340	1,441	1,575	14,804
Iowa	126	123	109	97	81	82	80	69	67	105	111	130	1,180
Kansas	72	63	49	40	47	56	39	67	73	72	88	106	772
Kentucky:													
Eastern	3,029	3,040	2,600	2,515	2,800	2,837	1,761	2,537	2,706	2,987	3,043	3,339	33,194
Western	2,449	2,328	2,198	2,290	2,224	2,427	2,056	2,477	2,581	2,927	2,812	2,847	29,616
Total Kentucky	5,478	5,368	4,798	4,805	5,024	5,264	3,817	5,014	5,287	5,914	5,855	6,186	62,810
Maryland	99	81	84	58	52	62	58	62	66	72	73	75	842
Missouri	301	263	233	231	177	202	124	189	201	218	282	327	2,748
Montana:													
Bituminous	17	15	14	13	11	11	8	11	10	13	16	13	152
Lignite	22	19	18	16	14	15	9	13	13	17	20	17	193
Total Montana	39	34	32	29	25	26	17	24	23	30	36	30	345
New Mexico	11	10	8	12	12	11	3	7	2	13	23	36	148
North Dakota (lignite)	285	262	205	133	83	155	95	112	196	297	305	285	2,413
Ohio	2,151	2,371	2,666	3,051	3,329	3,737	2,713	2,870	3,416	3,383	2,901	2,524	35,112
Oklahoma	162	144	145	133	150	151	86	89	90	105	131	139	1,525
Pennsylvania	6,446	6,079	6,513	6,122	6,030	5,968	3,538	3,625	3,955	4,365	5,677	7,029	65,347
South Dakota (lignite)	2	2	2	2	1	1	1	1	2	2	3	3	22
Tennessee	567	552	574	424	432	442	350	510	540	495	459	568	5,913
Utah	477	427	453	337	410	391	114	207	255	379	504	591	4,545
Virginia	2,440	2,404	2,519	2,576	2,619	2,643	2,129	2,458	2,574	2,570	2,280	2,557	29,769
Washington	18	10	16	21	16	23	5	13	27	33	30	30	242
West Virginia	10,207	9,475	10,179	10,664	10,846	11,173	7,023	9,003	9,530	9,913	9,907	11,772	119,692
Wyoming	208	177	148	125	107	104	91	107	161	240	240	269	1,977
Other States[1]	2	2	2	2						2	2	2	14
Total	36,485	34,273	35,396	35,096	35,495	36,775	24,377	30,088	32,571	34,921	35,997	40,554	412,028

[1] Includes Arizona and Georgia.

Digitized by Google

TABLE 9.—Production of bituminous coal and lignite in the United States in 1959, by districts, with estimates by months, in thousand net tons

[Totals for year are based on final complete returns from all operators known to have produced 1,000 or more tons per year. Monthly apportionment is based on current records of railroad carloadings and shipments on the Allegheny and Monongahela Rivers, supplemented by direct reports from local sources]

District	January	February	March	April	May	June	July	August	September	October	November	December	Total
1. Eastern Pennsylvania	3,048	2,863	3,064	2,860	2,812	2,795	1,680	1,727	1,884	2,076	2,672	3,295	30,776
2. Western Pennsylvania	3,520	3,319	3,557	3,343	3,293	3,259	1,932	1,980	2,159	2,383	3,100	3,838	35,683
3. Northern West Virginia	3,107	2,854	3,168	3,101	3,002	3,114	2,083	2,629	2,858	2,961	2,976	3,877	35,730
4. Ohio	2,151	2,371	2,666	3,051	3,329	3,737	2,713	2,870	3,416	3,383	2,901	2,524	35,112
5. Michigan													
6. Panhandle	316	297	319	328	320	327	280	318	334	350	352	414	3,955
7. Southern Numbered 1	3,164	2,901	3,099	3,252	3,287	3,373	1,990	2,486	2,577	2,690	2,703	3,262	34,784
8. Southern Numbered 2	9,401	9,171	9,027	9,302	9,888	10,076	6,750	8,846	9,337	9,739	9,448	10,422	111,407
9. West Kentucky	2,449	2,328	2,198	2,290	2,224	2,427	2,056	2,477	2,581	2,927	2,812	2,847	29,616
10. Illinois	4,221	3,575	3,681	3,544	3,529	3,675	2,677	3,677	4,000	4,242	4,222	4,423	45,466
11. Indiana	1,521	1,350	1,323	1,158	1,055	1,174	732	1,026	1,109	1,340	1,441	1,575	14,804
12. Iowa	126	123	109	97	81	82	80	69	67	105	111	130	1,180
13. Southeastern	1,374	1,286	1,451	1,336	1,332	1,306	699	971	965	978	1,143	1,535	14,376
14. Arkansas-Oklahoma	121	113	107	98	103	96	49	57	59	69	97	115	1,084
15. Southwestern	466	410	366	348	311	345	213	307	326	351	446	513	4,402
16. Northern Colorado	94	78	59	39	31	38	18	48	62	82	113	124	786
17. Southern Colorado	290	251	271	240	213	219	68	99	124	192	262	361	2,590
18. New Mexico	5	6	4	7	6	5	1	4		7	11	17	73
19. Wyoming	208	177	148	125	107	104	91	107	161	240	240	269	1,977
20. Utah	477	427	453	337	410	391	114	207	255	379	504	591	4,545
21. North-South Dakota	287	264	207	135	84	156	96	113	198	299	308	288	2,435
22. Montana	39	34	32	29	25	26	17	24	23	30	36	30	345
23. Washington	100	75	87	76	53	50	38	46	76	98	99	104	902
Total	36,485	34,273	35,396	35,096	35,495	36,775	24,377	30,088	32,571	34,921	35,997	40,554	412,028

Digitized by Google

TABLE 10.—Production of bituminous coal and lignite in the United States 1958–59, with estimates by weeks

1958				1959			
Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)	Week ended—	Production (thousand net tons)	Maximum number of working days	Average production per working day (thousand net tons)
Jan. 4	[1] 8,716	[1] 3	[2] 1,405	Jan. 3	[1] 1,777	[1] 2	[2] 1,403
Jan. 11	9,200	6	1,533	Jan. 10	8,604	6	1,434
Jan. 18	8,828	6	1,471	Jan. 17	8,696	6	1,449
Jan. 25	8,668	6	1,445	Jan. 24	8,394	6	1,399
Feb. 1	8,491	6	1,415	Jan. 31	9,014	6	1,502
Feb. 8	7,889	6	1,315	Feb. 7	8,772	6	1,462
Feb. 15	8,411	6	1,402	Feb. 14	8,515	6	1,419
Feb. 22	7,205	6	1,201	Feb. 21	8,400	6	1,400
Mar. 1	8,752	6	1,459	Feb. 28	8,586	6	1,431
Mar. 8	8,368	6	1,395	Mar. 7	7,927	6	1,321
Mar. 15	7,888	6	1,315	Mar. 14	7,835	6	1,306
Mar. 22	7,696	6	1,283	Mar. 21	8,183	6	1,364
Mar. 29	7,546	6	1,258	Mar. 28	8,159	6	1,360
Apr. 5	6,374	5.3	1,203	Apr. 4	7,157	5.4	1,325
Apr. 12	7,160	6	1,193	Apr. 11	8,157	6	1,360
Apr. 19	7,269	6	1,212	Apr. 18	8,190	6	1,365
Apr. 26	6,900	6	1,150	Apr. 25	8,266	6	1,378
May 3	6,502	6	1,084	May 2	8,403	6	1,401
May 10	6,360	6	1,060	May 9	8,500	6	1,417
May 17	7,424	6	1,237	May 16	8,384	6	1,397
May 24	7,376	6	1,229	May 23	8,537	6	1,423
May 31	7,293	5.6	1,302	May 30	8,289	5.8	1,429
June 7	7,833	6	1,306	June 6	8,558	6	1,426
June 14	8,375	6	1,396	June 13	9,166	6	1,528
June 21	9,000	6	1,500	June 20	9,404	6	1,567
June 28	9,017	5.5	1,639	June 27	8,805	5.7	1,545
July 5	1,356	1	1,356	July 4	1,844	1	1,844
July 12	1,417	1.3	1,090	July 11	1,564	1.8	869
July 19	7,646	6	1,274	July 18	7,388	6	1,231
July 26	8,011	6	1,335	July 25	7,397	6	1,233
Aug. 2	7,829	6	1,305	Aug. 1	7,285	6	1,214
Aug. 9	8,033	6	1,339	Aug. 8	6,813	6	1,136
Aug. 16	8,154	6	1,359	Aug. 15	7,243	6	1,207
Aug. 23	8,336	6	1,389	Aug. 22	7,168	6	1,195
Aug. 30	8,361	6	1,394	Aug. 29	7,343	6	1,224
Sept. 6	7,204	5	1,441	Sept. 5	7,345	6	1,224
Sept. 13	8,575	6	1,429	Sept. 12	6,414	5	1,283
Sept. 20	8,653	6	1,442	Sept. 19	7,803	6	1,301
Sept. 27	9,131	6	1,522	Sept. 26	7,809	6	1,302
Oct. 4	8,663	6	1,444	Oct. 3	7,611	6	1,269
Oct. 11	8,971	6	1,495	Oct. 10	7,767	6	1,295
Oct. 18	8,700	6	1,450	Oct. 17	7,970	6	1,328
Oct. 25	8,712	6	1,452	Oct. 24	8,101	6	1,350
Nov. 1	8,791	6	1,465	Oct. 31	7,934	6	1,322
Nov. 8	8,859	6	1,477	Nov. 7	7,824	6	1,304
Nov. 15	8,759	5.8	1,510	Nov. 14	9,025	5.8	1,556
Nov. 22	9,179	6	1,530	Nov. 21	9,602	6	1,600
Nov. 29	7,766	5	1,553	Nov. 28	8,151	5	1,630
Dec. 6	9,160	6	1,527	Dec. 5	9,221	6	1,537
Dec. 13	9,433	6	1,572	Dec. 12	9,335	6	1,556
Dec. 20	9,442	6	1,574	Dec. 19	9,569	6	1,595
Dec. 27	6,526	5	1,305	Dec. 26	6,984	5	1,397
Jan. 3	[1] 5,238	[1] 3	[2] 1,403	Jan. 2	[1] 6,840	[1] 4	[2] 1,495
Total	410,446	297.5	1,380	Total	412,028	298.5	1,380

[1] Figures represent output and number of working days in that part of week included in calendar year shown. Total production for the week ended January 4, 1958, was 7,025,000 net tons, and for January 2, 1960, 7,325,000 net tons.

[2] Average daily output for entire week and not for working days in the calendar year shown.

Digitized by Google

SUMMARY BY STATES

TABLE 11.—Bituminous coal and lignite produced in the United States, by States, 1950–59, with production of maximum year and cumulative production from earliest record to end of 1959, in thousand net tons

State	Maximum production		Production, by years										Total production from earliest record to end of 1959
	Year	Quantity	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	
Alabama	1926	21,001	14,422	13,597	11,383	12,532	10,282	13,088	12,663	13,260	11,182	11,947	946,634
Arkansas	1907	2,670	1,169	1,107	873	775	477	578	590	508	364	441	98,258
Colorado	1917	12,483	4,259	4,103	3,623	3,575	2,900	3,568	3,502	3,594	2,974	3,294	506,513
Illinois	1918	89,291	56,291	54,200	45,790	46,010	41,971	45,932	48,102	46,993	43,912	✓45,466	3,605,950
Indiana	1918	30,679	19,957	19,451	16,350	15,812	13,400	16,149	17,089	15,841	15,022	14,804	1,149,163
Iowa	1917	8,966	1,891	1,630	1,381	1,388	1,197	1,258	1,358	1,312	1,179	1,180	351,507
Kansas	1918	7,562	2,125	1,961	2,029	1,715	1,372	742	884	749	823	772	279,223
Kentucky	1947	84,241	78,495	74,972	66,114	65,060	56,964	69,020	74,555	74,667	66,312	✓62,810	2,644,743
Maryland	1907	5,533	648	589	588	530	422	512	669	748	838	842	266,211
Missouri	1917	5,671	2,963	3,269	2,955	2,393	2,514	3,232	3,283	2,976	2,592	2,748	286,393
Montana	1944	4,844	2,520	2,345	2,070	1,873	1,491	1,247	846	413	305	345	170,718
New Mexico	1918	4,023	727	783	760	514	123	201	158	137	117	148	125,108
North Dakota	1950	3,261	3,261	3,224	2,984	2,803	[1]	3,102	2,815	2,561	2,314	2,413	[2] 93,117
Ohio	1920	45,878	37,761	37,949	36,209	34,737	32,469	37,870	38,934	36,562	32,028	✓35,112	2,057,613
Oklahoma	1920	4,849	2,679	2,223	2,193	2,168	1,915	2,164	2,007	2,195	1,630	1,525	179,474
Pennsylvania	1918	178,551	105,870	108,164	89,181	93,331	72,010	85,713	90,287	85,365	67,771	✓65,347	8,228,830
Tennessee	1956	8,848	5,070	5,401	5,265	5,467	6,429	7,053	8,848	7,955	6,785	5,913	388,498
Utah	1947	7,429	6,670	6,136	6,140	6,544	5,008	6,296	6,522	6,858	5,328	✓4,545	257,913
Virginia	1959	29,769	17,667	21,400	21,579	19,119	16,387	23,508	28,063	29,506	26,826	✓29,769	787,947
Washington	1918	4,082	874	857	844	690	619	610	473	380	252	✓242	148,270
West Virginia	1947	176,157	144,116	163,310	141,713	134,105	115,996	139,168	165,891	156,842	119,468	✓119,692	6,352,044
Wyoming	1945	9,847	6,348	6,430	6,088	5,245	2,831	2,927	2,553	2,117	1,629	1,977	401,606
Other States [3]			528	564	729	904	4,929	695	782	885	795	696	184,770
Total	1947	630,624	516,311	533,665	466,841	457,290	391,706	464,633	500,874	492,704	410,446	412,028	29,510,503

[1] North Dakota included in "Other States" in 1954 to avoid disclosing individual operations.

[2] Excludes production of North Dakota in 1954 to avoid disclosing individual operations.

[3] Production, if any, in Alaska, Arizona, California, Georgia, Idaho, Michigan, North Carolina, Oregon, South Dakota, or Texas included in "Other States."

Digitized by Google

TABLE 12.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States

State	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Shipment by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
Alabama	187	9,335,246	793,338	1,818,556	11,947,140	$6.55	6,694	211	1,409,112	8.48
Alaska	8	652,829	3,724	3,347	659,900	8.89	248	231	57,196	11.54
Arizona	2		7,284		7,284	8.64	17	160	2,717	2.68
Arkansas	20	434,107	7,201		441,308	7.89	495	127	62,844	7.02
Colorado	98	2,417,522	780,717	95,903	3,294,142	6.39	1,934	196	378,388	8.71
Georgia	3		6,767		6,767	5.00	18	183	3,301	2.05
Illinois	137	39,888,813	5,442,120	134,683	45,465,616	4.06	10,548	213	2,242,976	20.27
Indiana	80	12,315,654	1,624,117	863,730	14,803,501	4.05	3,672	209	767,583	19.29
Iowa	54	743,721	435,097	1,082	1,179,900	3.57	519	198	102,957	11.46
Kansas	13	668,871	102,646	537	772,054	4.67	225	247	55,627	13.88
Kentucky	1,724	56,892,358	5,759,051	158,440	62,809,849	4.30	27,428	173	4,738,177	13.26
Maryland	92	361,666	480,734	27	842,427	3.78	593	190	112,933	7.46
Missouri	40	1,711,625	459,679	576,379	2,747,683	4.34	2,217	121	267,223	10.28
Montana:										
Bituminous	17	93,718	57,722	924	152,364	7.06	183	139	25,457	5.99
Lignite	7	175,574	17,163	54	192,791	2.08	36	195	7,030	27.42
Total Montana	24	269,292	74,885	978	345,155	4.28	219	148	32,487	10.62
New Mexico	19	97,277	51,055	218	148,550	5.64	202	214	43,277	3.43
North Dakota (lignite)	35	1,782,983	381,107	248,528	2,412,618	2.25	323	208	67,212	35.90
Ohio	476	18,824,700	12,452,621	3,834,659	35,111,980	3.86	9,275	219	2,027,408	17.32
Oklahoma	23	1,422,745	101,825	469	1,525,039	6.74	865	197	170,026	8.97
Pennsylvania	1,383	51,614,872	11,563,444	2,168,772	65,347,088	5.28	36,323	180	6,552,712	9.97
South Dakota (lignite)	1		21,825	300	22,125	4.01	9	252	2,269	9.75
Tennessee	480	3,658,166	2,236,656	17,902	5,912,724	3.99	5,238	140	733,947	8.06
Utah	46	4,100,458	424,335	19,764	4,544,557	6.16	2,212	202	446,376	10.18
Virginia	1,278	24,493,871	4,953,972	320,997	29,768,840	4.68	15,652	194	3,040,045	9.79
Washington	13	175,689	62,269	4,360	242,318	7.60	329	191	62,996	3.85
West Virginia	1,464	113,505,757	3,805,936	2,380,436	119,692,129	5.19	53,847	190	10,245,923	11.68
Wyoming	19	1,349,020	531,243	96,545	1,976,808	3.37	534	162	86,594	22.83
Total	7,719	346,717,242	52,563,648	12,746,612	412,027,502	4.77	179,636	188	33,712,306	12.22

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal, f.o.b. mines. Includes a value, estimated by producer, for coal not sold.

Digitized by Google

569112—60—5

TABLE 13.—Number of mines, production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by districts

District	Number of active mines	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
1. Eastern Pennsylvania	1,048	24,389,168	5,233,647	1,153,143	30,775,958	$4.59	17,827	176	3,144,059	9.79
2. Western Pennsylvania	448	27,732,599	6,935,133	1,015,684	35,683,416	5.83	19,319	184	3,551,690	10.05
3. Northern West Virginia	488	34,169,241	1,448,684	112,071	35,729,996	4.80	14,844	182	2,696,043	13.25
4. Ohio	476	18,824,700	12,452,621	3,834,659	35,111,980	3.86	9,275	219	2,027,408	17.32
5. Michigan	16	1,927,150	174,409	1,853,534	3,955,093	4.66	1,244	232	288,166	13.73
6. Panhandle	814	32,699,092	1,735,930	349,446	34,784,468	6.25	19,929	182	3,636,605	9.57
7. Southern Numbered 1	3,304	99,394,628	11,454,630	557,444	111,406,702	4.77	57,987	182	10,551,269	10.56
8. Southern Numbered 2	115	28,366,616	1,243,658	5,252	29,615,526	3.52	5,987	214	1,282,324	23.10
9. West Kentucky	137	39,888,813	5,442,120	134,683	45,465,616	4.06	10,548	213	2,242,976	20.27
10. Illinois	80	12,315,654	1,624,117	863,730	14,803,501	4.05	3,672	209	767,583	19.29
11. Indiana	54	743,721	435,097	1,082	1,179,900	3.57	519	198	102,957	11.46
12. Iowa	378	11,183,442	1,373,807	1,818,556	14,375,805	6.12	8,656	195	1,685,994	8.53
13. Southeastern	33	1,073,802	10,630	112	1,084,544	7.89	873	140	122,357	8.86
14. Arkansas-Oklahoma	63	3,163,546	660,721	577,273	4,401,540	4.71	2,929	148	433,363	10.16
15. Southwestern	7	582,048	194,979	9,176	786,203	4.47	282	204	57,559	13.66
16. Northern Colorado	96	1,902,491	600,944	86,863	2,590,298	6.96	1,758	197	346,810	7.47
17. Southern Colorado	16	30,260	43,133	82	73,475	5.20	113	177	20,013	3.67
18. New Mexico	19	1,349,020	531,243	96,545	1,976,808	3.37	534	162	86,594	22.83
19. Wyoming	46	4,100,458	424,335	19,764	4,544,557	6.16	2,212	202	446,376	10.18
20. Utah	36	1,782,983	402,932	248,828	2,434,743	2.26	332	209	69,481	35.04
21. North-South Dakota	24	269,292	74,885	978	345,155	4.28	219	148	32,487	10.62
22. Montana	21	828,518	65,993	7,707	902,218	8.56	577	208	120,192	7.51
23. Washington										
Total	7,719	346,717,242	52,563,648	12,746,612	412,027,502	4.77	179,636	188	33,712,306	12.22

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal, f.o.b. mines. Includes a value, estimated by producer, for coal not sold.

Digitized by Google

NUMBER AND SIZE OF MINES

The unit in the statistical record is the mine, and operating companies are requested to make a separate report for each mine because its location is definitely known and can be related to a specific district or county; its identity can be followed through successive changes of ownership; and it is the natural operating unit from the standpoint of cost, mechanical equipment, mining practice, and output per man per day. See figure 6.

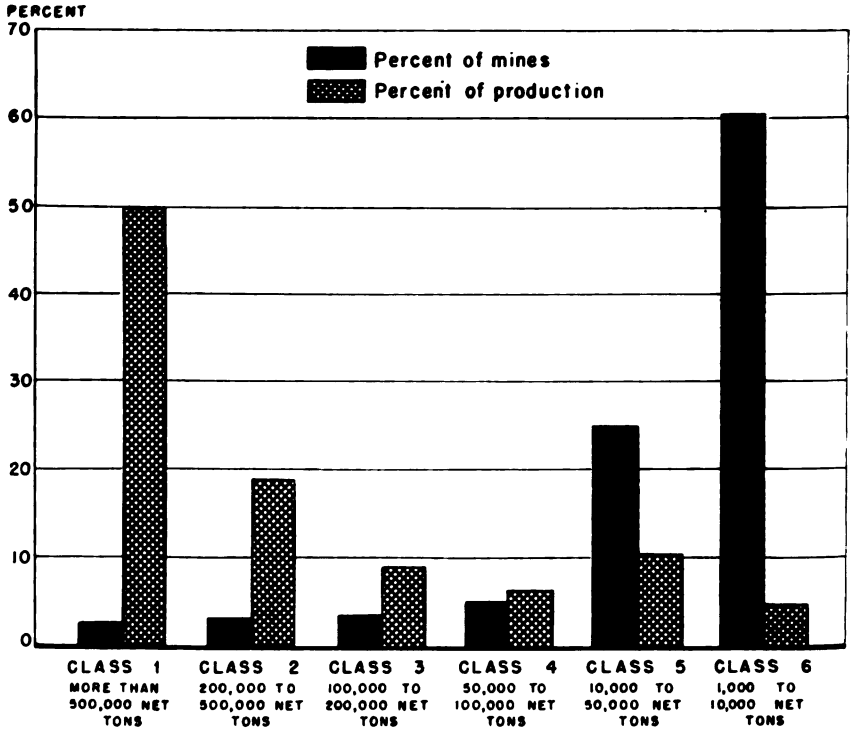

FIGURE 6.—Percentage of number of mines and of production of bituminous coal and lignite mines in the United States, 1959, by size of output.

Digitized by Google

TABLE 14.—Number and production of bituminous coal and lignite mines in the United States, 1959, by States and size of output

State	Class 1—500,000 tons and over				Class 2—200,000 to 500,000 tons				Class 3—100,000 to 200,000 tons			
	Mines		Production		Mines		Production		Mines		Production	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage
Alabama	7	3.7	6,352,117	53.2	8	4.3	2,081,842	17.4	12	6.4	1,655,141	13.9
Alaska									2	25.0	354,563	53.7
Arizona												
Arkansas												
Colorado					3	3.1	967,707	29.4	7	7.1	1,032,806	31.3
Georgia												
Illinois	39	28.5	39,849,656	87.6	9	6.6	3,069,101	6.8	6	4.4	925,713	2.0
Indiana	10	12.5	9,309,611	62.9	12	15.0	3,977,795	26.9	4	5.0	457,943	3.1
Iowa					1	1.8	245,735	20.8				
Kansas					1	7.7	432,699	56.0	1	7.7	199,583	25.9
Kentucky	31	1.8	31,982,897	50.9	31	1.8	10,035,491	16.0	40	2.3	5,566,500	8.9
Maryland									1	1.1	130,296	15.5
Missouri	3	7.5	1,748,478	63.6	1	2.5	277,659	10.1	1	2.5	153,635	5.6
Montana (bituminous and lignite)									1	4.1	175,574	50.9
New Mexico												
North Dakota (lignite)					6	17.1	1,911,448	79.2	1	2.9	157,609	6.5
Ohio	16	3.4	17,398,633	49.5	14	2.9	4,408,637	12.6	38	8.0	5,468,774	15.6
Oklahoma					1	4.4	266,258	17.5	5	21.7	764,695	50.1
Pennsylvania	31	2.2	28,806,867	44.1	35	2.5	11,050,732	16.9	55	4.0	7,722,155	11.8
South Dakota (lignite)												
Tennessee					5	1.0	1,579,617	26.7	2	.4	222,596	3.8
Utah	2	4.4	1,215,260	26.7	7	15.2	2,038,719	44.9	2	4.3	262,468	5.8
Virginia	8	.6	8,355,096	28.1	13	1.0	4,160,316	14.0	7	.6	1,016,547	3.4
Washington												
West Virginia	65	4.4	60,438,936	50.5	97	6.6	31,167,725	26.0	75	5.1	10,649,044	8.9
Wyoming					4	21.0	1,527,208	77.3	1	5.3	143,004	7.2
Total	212	2.7	205,457,551	49.9	248	3.2	79,198,689	19.2	261	3.4	37,058,646	9.0

Digitized by Google

TABLE 14.—Number and production of bituminous coal and lignite mines in the United States, 1959, by States and size of output—Con.

State	Class 4—50,000 to 100,000 tons				Class 5—10,000 to 50,000 tons				Class 6—less than 10,000 tons				Total		
	Mines		Production		Mines		Production		Mines		Production			Production (net tons)	
	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Number	Percentage	Net tons	Percentage	Mines	Total	Average per mine
Alabama	9	4.8	655,098	5.5	31	16.6	758,104	6.3	120	64.2	444,838	3.7	187	11,947,140	63,888
Alaska	3	37.5	241,637	36.6	2	25.0	61,372	9.3	1	12.5	2,328	.4	8	659,900	82,488
Arizona									2	100.0	7,284	100.0	2	7,284	3,642
Arkansas	4	20.0	288,864	65.5	4	20.0	113,210	25.6	12	60.0	39,234	8.9	20	441,308	22,065
Colorado	7	7.1	535,401	16.3	25	25.5	567,040	17.2	56	57.2	191,188	5.8	98	3,294,142	33,614
Georgia									3	100.0	6,767	100.0	3	6,767	2,256
Illinois	11	8.0	810,529	1.8	30	21.9	638,504	1.4	42	30.6	172,113	.4	137	45,465,616	331,866
Indiana	6	7.5	496,853	3.3	16	20.0	400,915	2.7	32	40.0	160,384	1.1	80	14,803,501	185,044
Iowa	6	11.1	446,313	37.8	17	31.5	342,899	29.1	30	55.6	144,953	12.3	54	1,179,900	21,850
Kansas	1	7.7	65,505	8.5	1	7.7	39,554	5.1	9	69.2	34,713	4.5	13	772,054	59,389
Kentucky	57	3.3	4,014,434	6.4	338	19.6	6,916,692	11.0	1,227	71.2	4,293,835	6.8	1,724	62,809,849	36,433
Maryland	1	1.1	65,699	7.8	27	29.3	438,958	52.1	63	68.5	207,474	24.6	92	842,427	9,157
Missouri	4	10.0	339,016	12.4	8	20.0	162,893	5.9	23	57.5	66,002	2.4	40	2,747,683	68,692
Montana (bituminous and lignite)	1	4.2	58,934	17.1	1	4.2	35,191	10.2	21	87.5	75,456	21.8	24	345,155	14,381
New Mexico	1	5.3	67,153	45.2	2	10.5	41,512	27.9	16	84.2	39,885	26.9	19	148,550	7,818
North Dakota (lignite)					11	31.4	274,527	11.4	17	48.6	69,034	2.9	35	2,412,618	68,932
Ohio	50	10.5	3,406,032	9.7	153	32.1	3,593,133	10.2	205	43.1	836,771	2.4	476	35,111,980	73,765
Oklahoma	3	13.0	273,655	18.0	8	34.8	204,781	13.4	6	26.1	15,650	1.0	23	1,525,039	66,306
Pennsylvania	97	7.0	7,188,787	11.0	329	23.8	7,470,097	11.4	836	60.5	3,108,450	4.8	1,383	65,347,088	47,250
South Dakota (lignite)					1	100.0	22,125	100.0					1	22,125	22,125
Tennessee	12	2.5	771,766	13.0	103	21.5	2,086,678	35.3	358	74.6	1,252,067	21.2	480	5,912,724	12,318
Utah	8	17.4	569,537	12.5	18	39.1	423,336	9.3	9	19.6	35,237	.8	46	4,544,557	98,795
Virginia	23	1.8	1,489,904	5.0	432	33.8	9,015,074	30.3	795	62.2	5,731,903	19.2	1,278	29,768,840	23,293
Washington	2	15.4	134,388	55.5	4	30.8	77,622	32.0	7	53.8	30,308	12.5	13	242,318	18,640
West Virginia	76	5.2	5,223,040	4.4	380	26.0	8,982,138	7.5	771	52.7	3,231,246	2.7	1,464	119,492,129	81,757
Wyoming	1	5.3	67,850	3.4	7	36.8	224,090	11.3	6	31.6	14,656	.8	19	1,976,808	104,043
Total	383	5.0	27,210,395	6.6	1,948	25.2	42,890,445	10.4	4,667	60.5	20,211,776	4.9	7,719	412,027,502	53,378

Digitized by Google

EMPLOYMENT AND PRODUCTIVITY

The bituminous coal and lignite industry has become highly mechanized in recent years. Mechanization has strongly affected production per man per day and the number of employees. In the past 20 years productivity has more than doubled, and the number of employees has declined more than 50 percent. See figure 7.

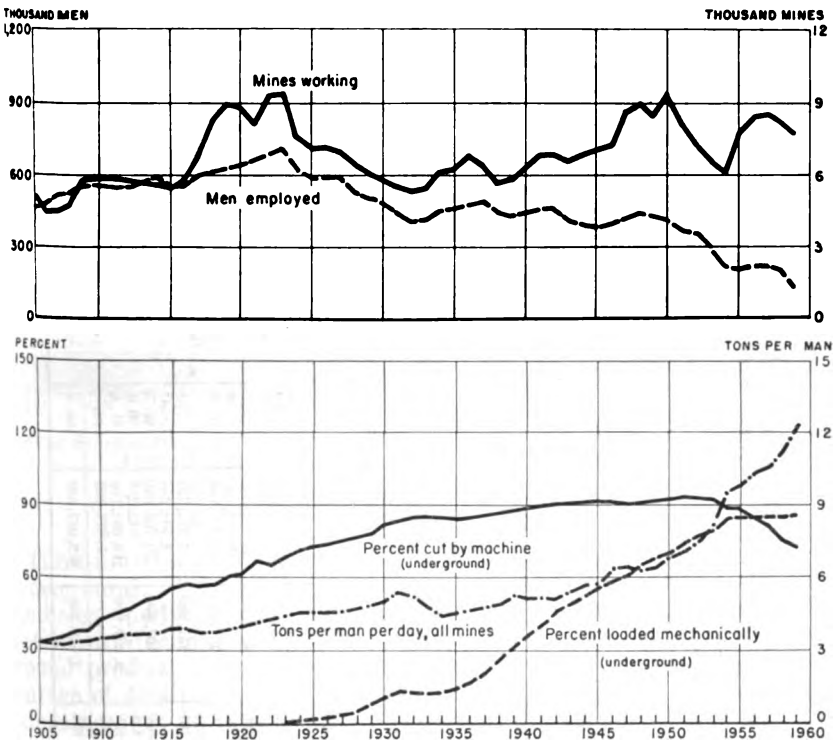

FIGURE 7.—Trends of employment, mechanization, and output per man at bituminous coal and lignite mines in the United States, 1905–59.

Digitized by Google

TABLE 15.—Production and average output per man per day of bituminous coal and lignite mines in the United States, 1959, by States and by underground, strip, and auger mining

State	Production (net tons)				Percentage of total production				Average tons per man per day			
	Underground	Strip	Auger	Total	Underground	Strip	Auger	Total	Underground	Strip	Auger	Total
Alabama	9,172,649	2,713,594	60,897	11,947,140	76.8	22.7	0.5	100.0	7.34	17.33	26.48	8.48
Alaska	117,689	542,211		659,900	17.8	82.2		100.0	5.51	15.13		11.54
Arizona	7,284			7,284	100.0			100.0	2.68			2.68
Arkansas	182,939	258,369		441,308	41.5	58.5		100.0	4.62	11.11		7.02
Colorado	2,742,314	551,828		3,294,142	83.2	16.8		100.0	7.66	27.28		8.71
Georgia	6,767			6,767	100.0			100.0	2.05			2.05
Illinois	23,526,417	21,911,997	27,202	45,465,616	51.7	48.2	.1	100.0	16.22	27.67	44.67	20.27
Indiana	4,644,018	10,159,483		14,803,501	31.4	68.6		100.0	11.71	27.38		19.29
Iowa	228,744	951,156		1,179,900	19.4	80.6		100.0	4.84	17.07		11.46
Kansas	6,059	765,995		772,054	.8	99.2		100.0	2.07	14.54		13.88
Kentucky	41,590,805	19,080,545	2,138,499	62,809,849	66.2	30.4	3.4	100.0	10.13	34.37	28.39	13.26
Maryland	294,343	548,084		842,427	34.9	65.1		100.0	3.95	14.24		7.46
Missouri	105,956	2,641,727		2,747,683	3.9	96.1		100.0	3.13	11.32		10.28
Montana:												
Bituminous	143,366	8,998		152,364	94.1	5.9		100.0	6.33	3.20		5.99
Lignite	13,327	179,464		192,791	6.9	93.1		100.0	5.81	37.90		27.42
Total Montana	156,693	188,462		345,155	45.4	54.6		100.0	6.28	24.99		10.62
New Mexico	116,828	31,722		148,550	78.6	21.4		100.0	2.94	8.85		3.43
North Dakota (lignite)	3,251	2,409,367		2,412,618	.1	99.9		100.0	4.27	36.26		35.90
Ohio	9,526,722	24,652,980	932,278	35,111,980	27.1	70.2	2.7	100.0	10.36	22.90	30.37	17.32
Oklahoma	345,289	1,179,750		1,525,039	22.6	77.4		100.0	3.44	16.97		8.97
Pennsylvania	44,642,165	20,306,986	397,937	65,347,088	68.3	31.1	.6	100.0	8.46	16.17	18.92	9.97
South Dakota (lignite)		22,125		22,125		100.0		100.0		9.75		9.75
Tennessee	4,211,135	1,363,701	337,888	5,912,724	71.2	23.1	5.7	100.0	6.48	19.05	27.51	8.06
Utah	4,544,557			4,544,557	100.0			100.0	10.18			10.18
Virginia	27,300,287	1,760,659	707,894	29,768,840	91.7	5.9	2.4	100.0	9.28	25.31	25.64	9.79
Washington	218,875	23,443		242,318	90.3	9.7		100.0	3.58	12.90		3.85
West Virginia	109,411,342	7,242,869	3,037,918	119,692,129	91.4	6.1	2.5	100.0	11.15	21.48	31.78	11.68
Wyoming	330,527	1,646,281		1,976,808	16.7	83.3		100.0	7.54	38.53		22.83
Total	283,433,655	120,953,334	7,640,513	412,027,502	68.8	29.4	1.8	100.0	10.08	22.65	28.77	12.22

Digitized by Google

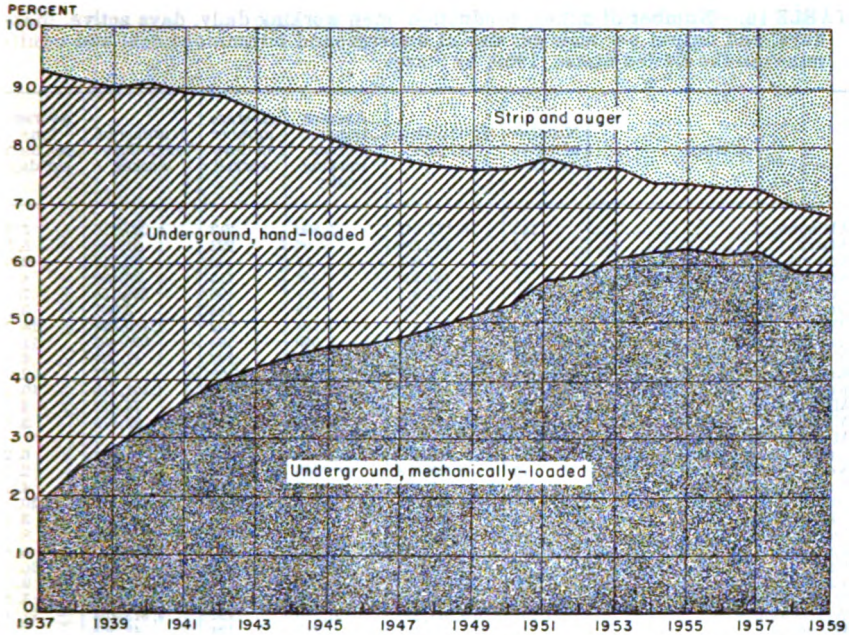

FIGURE 8.—Percentage of total production of bituminous coal and lignite in the United States, 1937–59, by type of mining and loading.

UNDERGROUND MINING

Three-fourths of the output of bituminous coal and lignite is mined underground. The major tasks underground are cutting, drilling shotholes, loading, and haulage. Loading is discussed later in the section on Mechanical Loading. For many years most of the underground production has been cut by machine; however, as the percentage of production by continuous mining machines increases, the percentage cut by machines will decrease. The use of power drills for shotholes increased rapidly from less than 50 percent of the underground production in 1940 to a maximum of 84 percent in 1953. The use of continuous mining machines decreased the tonnage power-drilled for shotholes to 73 percent of the underground output in 1959. Trolley locomotives are the principal method of underground haulage; however, in recent years the use of conveyor haulage has increased steadily.

Digitized by Google

TABLE 16.—Number of mines, production, men working daily, days active, man-days, and output per man per day at underground bituminous coal and lignite mines in the United States, 1959, by States

State	Number of active mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama	145	9,172,649	5,890	212	1,250,216	7.34
Alaska	2	117,689	96	223	21,359	5.51
Arizona	2	7,284	17	160	2,717	2.68
Arkansas	12	182,939	354	112	39,590	4.62
Colorado	90	2,742,314	1,811	198	358,156	7.66
Georgia	3	6,767	18	183	3,301	2.05
Illinois	64	23,526,417	7,181	202	1,450,494	16.22
Indiana	35	4,644,018	2,050	193	396,463	11.71
Iowa	22	228,744	290	163	47,224	4.84
Kansas	2	6,059	24	122	2,932	2.07
Kentucky	1,507	41,590,805	24,069	171	4,107,713	10.13
Maryland	55	294,343	395	188	74,452	3.95
Missouri	12	105,956	210	161	33,875	3.13
Montana (bituminous and lignite)	17	156,693	184	136	24,944	6.28
New Mexico	16	116,828	188	211	39,693	2.94
North Dakota (lignite)	1	3,251	5	152	761	4.27
Ohio	159	9,526,722	4,506	204	919,958	10.36
Oklahoma	9	345,289	482	209	100,513	3.44
Pennsylvania	756	44,642,165	30,457	173	5,275,606	8.46
Tennessee	398	4,211,135	4,420	147	650,090	6.48
Utah	46	4,544,557	2,212	202	446,376	10.18
Virginia	1,203	27,300,287	15,084	195	2,942,874	9.28
Washington	11	218,875	318	192	61,179	3.58
West Virginia	1,237	109,411,342	51,279	191	9,813,163	11.15
Wyoming	11	330,527	355	124	43,863	7.54
Total	5,815	283,433,655	151,895	185	28,107,512	10.08

Digitized by Google

TABLE 17.—Underground production of bituminous coal and lignite in the United States, 1959, by States and mining methods

State	Cut by hand and shot from solid		Cut by machines				Mined by continuous mining machines		Total underground (net tons)
	Net tons	Percentage of total underground	Net tons	Percentage of total underground	Number of coal-cutting machines	Average output per machine (net tons)	Net tons	Percentage of total underground	
Alabama	223,870	2.5	7,661,365	83.5	185	41,413	1,287,414	14.0	9,172,649
Alaska	117,689	100.0							117,689
Arizona	2,961	40.7	4,323	59.3	1	4,323			7,284
Arkansas			154,321	84.4	37	4,171	28,618	15.6	182,939
Colorado	406,079	14.8	1,482,260	54.1	212	6,992	853,975	31.1	2,742,314
Georgia	6,767	100.0							6,767
Illinois	13,391	.1	17,532,560	74.5	144	121,754	5,980,466	25.4	23,526,417
Indiana	1,313		4,215,693	90.8	81	52,046	427,012	9.2	4,644,018
Iowa	67,016	29.3	161,728	70.7	18	8,985			228,744
Kansas			6,059	100.0	3	2,020			6,059
Kentucky	2,988,127	7.2	35,611,849	85.6	1,138	31,293	2,990,829	7.2	41,590,805
Maryland	55,288	18.8	239,055	81.2	40	5,976			294,343
Missouri	1,172	1.1	104,784	98.9	18	5,821			105,956
Montana:									
Bituminous	2,554	1.8	140,812	98.2	21	6,705			143,366
Lignite	10,929	82.0	2,398	18.0	2	1,199			13,327
Total Montana	13,483	8.6	143,210	91.4	23	6,227			156,693
New Mexico	23,990	20.5	48,484	41.5	13	3,730	44,354	38.0	116,828
North Dakota (lignite)	3,251	100.0							3,251
Ohio	54,975	.6	6,657,988	69.9	254	26,213	2,815,759	29.5	9,526,722
Oklahoma	3,429	1.0	341,860	99.0	54	6,331			345,289
Pennsylvania	940,129	2.1	21,040,925	47.1	1,314	16,013	22,661,111	50.8	44,642,165
Tennessee	932,059	22.1	3,243,076	77.0	198	16,379	36,000	.9	4,211,135
Utah			3,375,078	74.3	120	28,126	1,169,479	25.7	4,544,557
Virginia	4,718,532	17.3	21,298,618	78.0	965	22,071	1,283,137	4.7	27,300,287
Washington	125,345	57.3					93,530	42.7	218,875
West Virginia	2,541,889	2.3	80,788,389	73.9	2,058	39,256	26,081,064	23.8	109,411,342
Wyoming	1,902	.6	287,297	86.9	31	9,268	41,328	12.5	330,527
Total	13,242,657	4.7	204,398,922	72.1	6,907	29,593	65,792,076	23.2	283,433,655

Digitized by Google

TABLE 18.—Use of power drills in underground bituminous coal and lignite mines in the United States, 1959, by States

State	Number of mines using power drills	Number of power drills				Production where shot holes are power-drilled (net tons)			
		Face or coal drills		Roof or rock drills		Hand-held and post-mounted drills	Mobile drills	Total	Percentage of total underground
		Hand-held and post-mounted	Mobile	Rotary	Percussion				
Alabama	86	229	-------	35	101	7,707,545	----------	7,707,545	84.0
Alaska	2	36	-------	-------	-------	117,689	----------	117,689	100.0
Arizona	1	1	-------	-------	-------	4,323	----------	4,323	59.3
Arkansas	7	16	-------	2	1	170,905	----------	170,905	93.4
Colorado	79	246	4	10	108	1,474,358	98,958	1,573,316	57.4
Illinois	61	65	126	100	1	826,889	16,708,765	17,535,654	74.5
Indiana	34	49	45	28	1	629,879	3,585,814	4,215,693	90.8
Iowa	16	36	-------	2	-------	209,293	----------	209,293	91.5
Kansas	1	1	-------	-------	-------	3,159	----------	3,159	52.1
Kentucky	927	1,448	127	202	84	23,799,945	13,216,760	37,016,705	89.0
Maryland	28	39	-------	-------	-------	231,780	----------	231,780	78.7
Missouri	6	7	1	3	3	85,849	2,680	88,529	83.6
Montana:									
Bituminous	13	16	1	-------	1	133,991	7,951	141,942	99.0
Lignite	3	9	-------	-------	-------	13,327	----------	13,327	100.0
Total Montana	16	25	1	-------	1	147,318	7,951	155,269	99.1
New Mexico	10	10	2	-------	2	36,170	22,799	58,969	50.5
North Dakota (lignite)	1	1	-------	-------	-------	3,251	----------	3,251	100.0
Ohio	122	224	38	55	4	4,013,891	2,109,225	6,123,116	64.3
Oklahoma	5	47	-------	-------	-------	304,330	----------	304,330	88.1
Pennsylvania	400	1,185	125	254	471	14,530,849	5,536,081	20,066,930	45.0
Tennessee	162	285	-------	17	11	3,513,320	----------	3,513,320	83.4
Utah	43	37	100	5	155	461,475	2,860,549	3,322,024	73.1
Virginia	1,099	1,316	17	51	88	20,316,009	3,273,158	23,589,167	86.4
Washington	8	58	-------	4	4	118,613	----------	118,613	54.2
West Virginia	857	2,396	137	571	428	65,467,471	15,160,060	80,627,531	73.7
Wyoming	8	44	-------	12	-------	286,189	----------	286,189	86.6
Total	3,979	7,801	723	1,351	1,463	144,460,500	62,582,800	207,043,300	73.0

TABLE 19.—Number of underground bituminous coal and lignite mines and number of haulage units in use in the United States, in selected years [1]

Year	Underground mines	Locomotives				Rope-haulage units			Shuttle cars			Gathering and haulage conveyors	Animals
		Trolley	Battery	Other types	Total	Portable	Stationary	Total	Cable reel	Battery	Total		
1924	7,352	[2] 12,765	1,515	443	14,723	(3)	(3)	649	(3)	(3)	(3)	(3)	36,352
1946	5,888	14,110	1,011	110	15,231	4,084	1,009	5,093	(3)	(3)	(3)	457	10,185
1948	7,108	14,617	904	74	15,595	3,886	1,044	4,930	(3)	(3)	(3)	755	10,834
1949	6,798	14,090	928	59	15,077	3,904	1,073	4,977	2,144	623	2,767	860	10,313
1950	7,559	13,822	949	62	14,833	4,225	1,037	5,262	2,782	512	3,294	1,013	10,033
1951	6,225	13,327	900	51	14,278	3,875	916	4,791	3,191	567	3,758	1,094	7,478
1952	5,632	12,545	812	41	13,398	3,584	852	4,436	3,382	462	3,844	1,066	6,555
1953	5,034	11,311	678	45	12,034	2,838	727	3,565	3,797	425	4,222	1,042	5,354
1954	4,653	10,155	762	38	10,955	1,926	781	2,707	4,400	431	4,831	1,081	5,409
1955	6,035	9,538	658	40	10,236	1,327	577	1,904	4,413	241	4,654	1,002	6,440
1956	6,542	9,445	861	102	10,408	1,420	575	1,995	5,047	260	5,307	1,114	6,097
1957	6,512	8,997	898	138	10,033	1,214	616	1,830	5,513	280	5,793	1,233	5,054
1958	6,319	8,057	920	138	9,115	926	538	1,464	5,328	295	5,623	1,235	4,678
1959	5,815	7,263	949	137	8,349	900	504	1,404	5,341	291	5,632	1,416	3,767

[1] Exclusive of lignite and Virginia semianthracite mines in 1946, 1948, and 1949.
[2] Includes combination trolley and battery locomotives.
[3] Data not available.

Digitized by Google

TABLE 20.—Number of haulage units in use in underground bituminous coal and lignite mines in the United States, 1958–59, by States

State	Locomotives						Shuttle cars				Rope-haulage units				Gathering and haulage conveyor units		Animals	
	Trolley		Battery		Other types		Cable reel		Battery		Portable		Stationary					
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	297	297				1	171	185		2	16	14	8	10	42	46	71	113
Alaska			11	10						1	2		1			1		
Arizona																	3	3
Arkansas	4	3	7	6							5	2	9	10	4	3	5	6
Colorado	85	87	52	54	4		75	76	21	25	30	38	53	37	14	19	60	54
Georgia																	2	2
Illinois	292	252	45	43			305	282	1	1			18	20	99	116	62	44
Indiana	138	127	3	3	1	1	109	111			1	1	15	13	8	14	32	30
Iowa	3	3	2	1			2	2	3	3		1	6	7			54	48
Kansas																	3	3
Kentucky	1,143	892	62	103	11	10	1,201	1,265	61	73	78	110	59	50	159	180	1,373	1,015
Maryland	8	6	4	4									8	9			93	94
Missouri			3	3									2	2			24	22
Montana:																		
Bituminous	17	17	2	2			7	5			3	4	6	6			5	4
Lignite													1	1			8	6
Total Montana	17	17	2	2			7	5			3	4	7	7			13	10
New Mexico	5	10		2			6				7	3	5	4			24	17
North Dakota (lignite)																	1	1
Ohio	263	250	27	27	3	4	112	117			32	34	20	17	21	28	100	84
Oklahoma	4	4	6	5			4	4					4	5			4	2
Pennsylvania	2,201	2,000	113	136	29	29	1,068	1,059	87	67	488	419	213	189	241	316	602	526
Tennessee	118	89	8	13	1	2	30	54	2		9	5	4	3	20	19	394	342
Utah	161	139	12	21	1	1	180	76	9	9	2	1	26	17	36	43	11	8
Virginia	660	753	350	319	26	16	236	237	3	3	37	46	3	4	35	47	595	654
Washington	17	19									4	7	6	9	2	2	3	4
West Virginia	2,623	2,305	209	193	62	73	1,803	1,850	108	107	211	215	62	84	550	575	1,146	979
Wyoming	18	10	4	4			19	18			1		9	7	4	7	3	2
Total	8,057	7,263	920	949	138	137	5,328	5,341	295	291	926	900	538	504	1,235	1,416	4,678	4,063

Digitized by Google

TABLE 21.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors and number and length of units in use in the United States, 1945–59

Year	Number of mines	Production (net tons)	Number of units in use	Average length (feet)	Total length (miles)
1945	117	40,189,857	339	1,438	97.6
1946	161	48,022,710	457	1,484	128.5
1947	199	70,690,920	594	1,470	165.3
1948	270	81,821,361	755	1,460	208.8
1949	314	69,947,713	860	1,514	246.7
1950	374	92,413,644	1,013	1,538	294.9
1951	372	99,643,003	1,094	1,568	325.0
1952	358	92,168,992	1,066	1,526	308.2
1953	322	100,155,249	1,042	1,541	303.9
1954	291	83,211,284	1,081	1,626	332.9
1955	314	97,677,313	1,002	1,682	319.6
1956	314	126,717,518	1,114	1,656	349.4
1957	362	136,914,192	1,233	1,672	390.4
1958	366	115,419,740	1,235	1,711	400.3
1959	371	126,654,911	1,416	1,723	462.1

[1] Includes all gathering and haulage conveyors with capacity over 500 feet, except main-slope conveyors. Excludes lignite and Virginia semianthracite mines in 1945–49.

TABLE 22.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors, and number and length of units in use in the United States, 1958–59, by States [1]

State	Number of mines		Production (net tons)		Number of units in use		Average length (feet)		Total length (miles)	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	8	8	5,080,548	3,768,239	42	46	1,784	1,723	14.2	15.0
Alaska		1		98,903		1		1,800		.3
Arkansas	2	1	14,606	72,595	4	3	800	1,000	.6	.6
Colorado	4	5	710,319	758,121	14	19	1,643	1,458	4.4	5.2
Illinois	13	14	14,102,538	18,017,450	99	116	1,968	2,027	36.9	44.5
Indiana	3	4	960,008	1,217,241	8	14	975	1,314	1.5	3.5
Kentucky	50	42	18,765,507	17,647,067	159	180	2,227	1,574	67.1	53.7
Ohio	9	12	3,352,267	5,109,493	21	28	1,676	1,421	6.7	7.5
Pennsylvania	64	69	16,403,953	19,988,299	241	316	1,713	1,632	78.2	97.7
Tennessee	6	5	678,748	680,725	20	19	1,596	1,474	6.0	5.3
Utah	15	21	2,877,411	3,366,642	36	43	1,155	1,608	7.9	13.1
Virginia	11	10	2,891,018	2,698,616	35	47	1,800	1,989	11.9	17.7
Washington	1	1	45,611	24,283	2	2	3,500	3,500	1.3	1.3
West Virginia	178	174	49,485,807	53,078,838	550	575	1,561	1,791	162.6	195.0
Wyoming	2	4	51,399	128,396	4	7	1,275	1,043	1.0	1.4
Total	366	371	115,419,740	126,654,911	1,235	1,416	1,711	1,723	400.3	461.8

[1] Includes all mines using belt conveyors, other than main-slope conveyors, 500 feet or more long for transporting coal underground.

STRIP MINING

Strip mines have two substantial advantages over underground mines: (1) The output per man per day in strip mines is more than double that in underground mines, and (2) the average cost of strip coal, f.o.b. mines, is about one-third lower than that of coal from underground mines. See figures 9 and 10.

The rapid growth of strip mining was made possible by the development of larger and improved stripping and drilling equipment and

Digitized by Google

trucks. The most notable recent change in stripping equipment has been replacement of virtually all steam shovels by diesel-powered and large electric shovels and draglines.

An increase in the average capacity of trucks used in strip mines has reduced the number required. The average hauling distance from strip mines to tipples or ramps has remained approximately 4 miles.

The average thickness of overburden at all bituminous coal and lignite strip mines in the United States was 42 feet in 1955, the latest year for which figures are available. Several strip mines handled an average of more than 60 feet of overburden in 1955, and a few handled more than 70 feet.

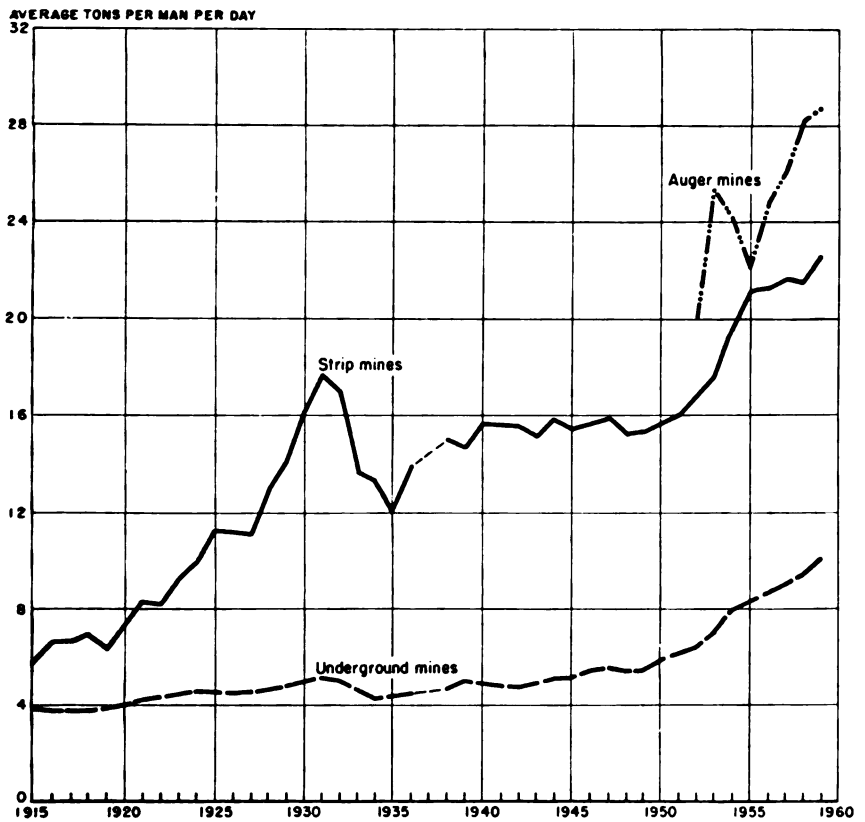

FIGURE 9.—Average tons per man per day at bituminous coal and lignite mines in the United States, 1915–59, by underground, strip, and auger mines.

Digitized by Google

TABLE 23.—Growth of strip mining at bituminous coal and lignite mines in the United States, 1914–59, compared with underground and auger mining

Year	Production (thousand net tons)				Percentage of total mined by stripping	Average tons per man per day				Average value per ton f.o.b. mine				Number of strip mines	Number of power shovels and draglines
	Underground mines	Strip mines [1]	Auger mines	Total		Underground mines	Strip mines [1]	Auger mines	Total	Underground mines	Strip mines [1]	Auger mines	Total		
1914	421,423	1,281		422,704	0.3	3.71	5.06		3.71	(2)	(2)		$1.17	[3] 35	48
1915	439,792	2,832		442,624	.6	3.90	5.81		3.91	$1.13	$1.18		1.13	[3] 60	87
1916	498,587	3,933		502,520	.8	3.88	6.67		3.90	1.32	1.51		1.32	[3] 79	111
1917	546,001	5,790		551,791	1.0	3.75	6.52		3.77	2.26	2.34		2.26	[3] 126	182
1918	571,098	8,288		579,386	1.4	3.76	6.81		3.78	2.58	2.54		2.58	[3] 165	276
1919	460,225	5,635		465,860	1.2	3.82	6.21		3.84	2.49	2.33		2.49	[3] 168	287
1920	559,807	8,860		568,667	1.5	3.97	7.20		4.00	3.74	4.12		3.75	[3] 174	312
1921	410,865	5,057		415,922	1.2	4.18	8.28		4.20	2.89	2.87		2.89	[3] 155	279
1922	412,059	10,209		422,268	2.4	4.24	8.09		4.28	3.02	3.07		3.02	272	379
1923	552,625	11,940		564,565	2.1	4.43	9.32		4.47	2.69	2.31		2.68	263	442
1924	470,080	13,607		483,687	2.8	4.50	9.91		4.56	2.20	2.00		2.20	234	420
1925	503,182	16,871		520,053	3.2	4.45	11.18		4.52	2.05	1.84		2.04	227	389
1926	556,444	16,923		573,367	3.0	4.42	11.13		4.50	2.07	1.89		2.06	237	410
1927	499,385	18,378		517,763	3.6	4.47	11.06		4.55	1.99	1.90		1.99	255	455
1928	480,956	19,789		500,745	4.0	4.61	13.02		4.73	1.87	1.69		1.86	250	415
1929	514,721	20,268		534,989	3.8	4.73	14.08		4.85	1.79	1.57		1.78	200	411
1930	447,684	19,842		467,526	4.3	4.93	16.21		5.06	1.71	1.54		1.70	218	341
1931	363,157	18,932		382,089	5.0	5.12	17.68		5.30	1.54	1.51		1.54	235	314
1932	290,069	19,641		309,710	6.3	4.99	16.95		5.22	1.31	1.32		1.31	255	332
1933	315,360	18,270		333,630	5.5	4.60	13.59		4.78	1.34	1.33		1.34	289	389
1934	338,578	20,790		359,368	5.8	4.23	13.28		4.40	1.76	1.49		1.75	344	458
1935	348,726	23,647		372,373	6.4	4.32	12.01		4.50	1.79	1.47		1.77	368	507
1936	410,962	28,126		439,088	6.4	4.42	13.91		4.62	1.77	1.49		1.76	381	562
1937	413,780	31,751		445,531	7.1	(2)	(2)		4.69	(2)	(2)		1.94	449	(3)
1938	318,138	30,407		348,545	8.7	4.60	15.00		4.89	(2)	(2)		1.95	465	737
1939	357,133	37,722		394,855	9.6	4.92	14.68		5.25	1.88	1.49		1.84	537	914
1940	417,604	43,167		460,771	9.4	4.86	15.63		5.19	1.94	1.56		1.91	638	1,071
1941	459,078	55,071		514,149	10.7	4.83	15.59		5.20	2.23	1.79		2.19	769	1,321
1942	515,490	67,203		582,693	11.5	4.74	15.52		5.12	2.41	1.90		2.36	834	1,438
1943	510,492	79,685		590,177	13.5	4.89	15.15		5.38	2.75	2.28		2.69	1,004	1,830
1944	518,678	100,898		619,576	16.3	5.04	15.89		5.67	3.01	2.48		2.92	1,240	2,312

Digitized by Google

1945	467,630	109,987	----------	577,617	19.0	5.04	15.46	----------	5.78	3.16	2.65	----------	3.06	1,370	2,439
1946	420,958	112,964	----------	533,922	21.1	5.43	15.73	----------	6.30	3.59	2.87	----------	3.44	1,445	2,744
1947	491,229	139,395	----------	630,624	22.1	5.49	15.93	----------	6.42	4.35	3.47	----------	4.16	1,750	3,254
1948	460,012	139,506	----------	599,518	23.3	5.31	15.28	----------	6.26	5.26	4.11	----------	4.99	1,971	3,712
1949	331,823	106,045	----------	437,868	24.2	5.42	15.33	----------	6.43	5.18	3.94	----------	4.88	1,761	3,576
1950	392,844	123,467	----------	516,311	23.9	5.75	15.66	----------	6.77	5.15	3.87	----------	4.84	1,870	3,877
1951	416,047	117,618	----------	533,665	22.0	6.08	16.02	----------	7.04	5.21	3.88	----------	4.92	1,784	3,810
1952	356,425	108,910	1,506	466,841	23.3	6.37	16.77	20.07	7.47	5.24	3.81	$4.31	4.90	1,643	3,527
1953	349,551	105,448	2,291	457,290	23.1	7.01	17.62	25.30	8.17	5.27	3.75	4.15	4.92	1,554	3,390
1954	289,112	98,134	4,460	391,706	25.1	7.99	19.64	24.12	9.47	4.87	3.52	3.41	4.52	1,329	3,409
1955	343,465	115,093	6,075	464,633	24.8	8.28	21.12	22.22	9.84	4.86	3.48	3.60	4.50	1,617	3,265
1956	365,774	127,055	8,045	500,874	25.4	8.62	21.18	24.85	10.28	5.20	3.74	4.17	4.82	1,728	3,705
1957	360,649	124,109	7,946	492,704	25.2	8.91	21.64	26.19	10.59	5.52	3.89	4.12	5.08	1,756	3,723
1958	286,884	116,242	7,320	410,446	28.3	9.38	21.54	28.15	11.33	5.33	3.80	3.60	4.86	1,646	3,515
1959	283,434	120,953	7,641	412,028	29.4	10.08	22.65	28.77	12.22	5.23	3.76	3.83	4.77	1,594	3,417

[1] Includes power strip pits proper and excludes horse stripping operations and mines combining stripping and underground in the same operation for the period 1914–42. The years 1943–59 include data on all strip mines.

[2] Data not available.

[3] Exclusive of horse stripping operations.

Digitized by Google

TABLE 24.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1932–59

Year	Number of strip mines	Production (thousand net tons)	Number of power shovels and dragline excavators											Number of carry-all scrapers	Number of bulldozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total		
			Electric	Diesel-electric	Diesel	Gasoline	Steam	Less than 3	3–5, inclusive	6–12, inclusive	More than 12	Power shovels	Dragline excavators			
1932	255	19,641	[1] 105	(2)	[3] 61	(4)	166	(5)	(5)	(5)	(5)	(5)	(5)	332	(5)	(5)
1933	289	18,270	[1] 117	(2)	[3] 103	(4)	169	(5)	(5)	(5)	(5)	(5)	(5)	389	(5)	(5)
1934	344	20,790	[1] 121	(2)	[3] 149	(4)	188	(5)	(5)	(5)	(5)	(5)	(5)	458	(5)	(5)
1935	368	23,647	[1] 139	(2)	[3] 194	(4)	174	(5)	(5)	(5)	(5)	(5)	(5)	507	(5)	(5)
1936	381	28,126	[1] 151	(2)	[3] 223	(4)	188	(5)	(5)	(5)	(5)	(5)	(5)	562	(5)	(5)
1937	449	31,751	(4)	(5)	(4)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
1938	465	30,407	[1] 155	(2)	[3] 440	(4)	142	(5)	(5)	(5)	(5)	(5)	(5)	737	(5)	(5)
1939	537	37,722	[1] 184	(2)	[3] 524	(4)	206	(5)	(5)	(5)	(5)	(5)	(5)	914	(5)	(5)
1940	638	43,167	[1] 194	(2)	[3] 697	(4)	180	(5)	(5)	(5)	(5)	(5)	(5)	1,071	(5)	(5)
1941	769	55,071	[1] 210	(2)	[3] 911	(4)	200	1,009	153	95	64	(5)	(5)	1,321	(5)	(5)
1942	834	67,203	[1] 219	(2)	[3] 1,020	(4)	199	1,114	159	97	68	(5)	(5)	1,438	(5)	(5)
1943	1,004	79,685	[1] 234	(2)	[3] 1,433	(4)	172	1,488	173	106	72	(5)	(5)	1,839	(5)	(5)
1944	1,240	100,898	[1] 244	(2)	[3] 1,902	(4)	166	1,900	225	113	74	(5)	(5)	2,312	(5)	(5)
1945	1,370	109,987	[1] 256	(2)	[3] 2,042	(4)	141	2,004	243	117	75	(5)	(5)	2,439	(5)	(5)
1946	1,445	112,964	[1] 261	(2)	1,619	753	111	2,256	302	112	74	2,406	338	2,744	263	(5)
1947	1,750	139,395	[1] 301	(2)	2,279	591	83	2,685	362	123	84	2,822	432	3,254	275	(5)
1948	1,971	139,506	[1] 337	(2)	2,675	646	54	3,048	446	130	88	3,177	535	3,712	362	(5)
1949	1,761	106,045	[1] 352	(2)	2,646	527	51	2,931	367	168	110	3,011	565	3,576	320	(5)
1950	1,870	123,467	[1] 348	(2)	2,880	607	42	3,182	416	170	109	3,247	630	3,877	286	(5)
1951	1,784	117,618	[1] 346	(2)	2,905	533	26	3,088	420	187	115	3,164	646	3,810	220	(5)
1952	1,643	108,910	[1] 321	(2)	2,642	545	19	2,800	425	183	119	2,892	635	3,527	218	(5)
1953	1,554	105,448	[1] 317	(2)	2,629	446	17	2,692	413	193	111	2,793	616	3,409	244	1,954
1954	1,329	98,134	[1] 381	(2)	2,617	374	18	2,480	579	211	120	2,605	785	3,390	269	2,599
1955	1,617	115,093	[1] 315	(2)	2,603	337	10	2,381	550	223	111	2,592	673	3,265	187	2,106
1956	1,728	127,055	285	136	2,914	365	5	2,693	634	249	129	2,899	806	3,705	226	2,381
1957	1,756	124,109	325	164	2,839	389	6	2,748	566	266	143	2,894	829	3,723	215	2,499
1958	1,646	116,242	315	273	2,607	315	5	2,507	591	275	142	2,704	811	3,515	173	2,472
1959	1,594	120,953	309	215	2,579	307	7	2,435	572	267	143	2,607	810	3,417	161	2,443

[1] Includes diesel-electric shovels.
[2] Included with electric shovels.
[3] Includes gasoline shovels.
[4] Included with diesel shovels.
[5] Data not available.

Digitized by Google

TABLE 25.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1959, by States

State	Number of strip mines	Production (net tons)	Number of power shovels and dragline excavators											Number of carry-all scrapers	Number of bull-dozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total	
			Electric	Diesel-electric	Diesel	Gas	Steam	Less than 3	3–5, inclusive	6–12, inclusive	More than 12	Power shovels	Dragline excavators		
Alabama	39	2,713,594	13	4	82		2	74	15	8	4	85	16	101	4	52
Alaska	6	542,211			16			16				14	2	16	3	28
Arkansas	8	258,369	1	4	9			6	3	4	1	6	8	14		11
Colorado	8	551,828	2	2	7			6	2	2	1	6	5	11	4	12
Illinois	71	21,911,997	93	10	65	8		43	46	40	47	113	63	176		110
Indiana	45	10,159,483	47	10	54	14		47	37	20	21	73	52	125	6	94
Iowa	32	951,156	4		41	20		47	14	3	1	34	31	65	6	42
Kansas	11	765,995	5	1	8	1	1	9	2	2	3	7	9	16	1	15
Kentucky:																
Eastern	81	1,700,191	1	3	101	8		98	14	1		111	2	113	2	93
Western	54	17,380,354	36	6	94	6		62	37	25	18	99	43	142	5	107
Total Kentucky	135	19,080,545	37	9	195	14		160	51	26	18	210	45	255	7	200
Maryland	37	548,084	1	1	28	15		42	3			40	5	45		28
Missouri	28	2,641,727	17	3	16	12	2	25	11	5	9	34	16	50		31
Montana:																
Bituminous	3	8,998	3			1		1		1	2	3	1	4		2
Lignite	4	179,464	1		1	1		1	1	1		2	1	3	1	4
Total Montana	7	188,462	4		1	2		2	1	2	2	5	2	7	1	6
New Mexico	3	31,722		1		1		2				2		2	1	2
North Dakota (lignite)	34	2,409,367	20	4	21	14		40	8	10	1	48	11	59	21	30
Ohio	258	24,652,980	43	43	428	72		394	122	50	20	460	126	586	51	507
Oklahoma	14	1,179,750	5	11	9		1	14	4	4	4	17	9	26		11
Pennsylvania	589	20,306,986	10	87	1,152	107		1,065	199	82	10	974	382	1,356	21	877
South Dakota (lignite)	1	22,125			1	1		1	1			1	1	2	1	1
Tennessee	69	1,363,701		2	86	12		95	4	1		94	6	100	1	69
Virginia	42	1,760,659		6	61	8		67	7	1		75		75	9	38
Washington	2	23,443				1		1				1		1		3
West Virginia	147	7,242,869	3	15	293	3		268	40	5	1	297	17	314	11	262
Wyoming	8	1,646,281	4	2	6	2	1	10	3	2		11	4	15	13	16
Total	1,594	120,953,334	309	215	2,579	307	7	2,434	573	267	143	2,607	810	3,417	161	2,445

569112—60—6

Digitized by Google

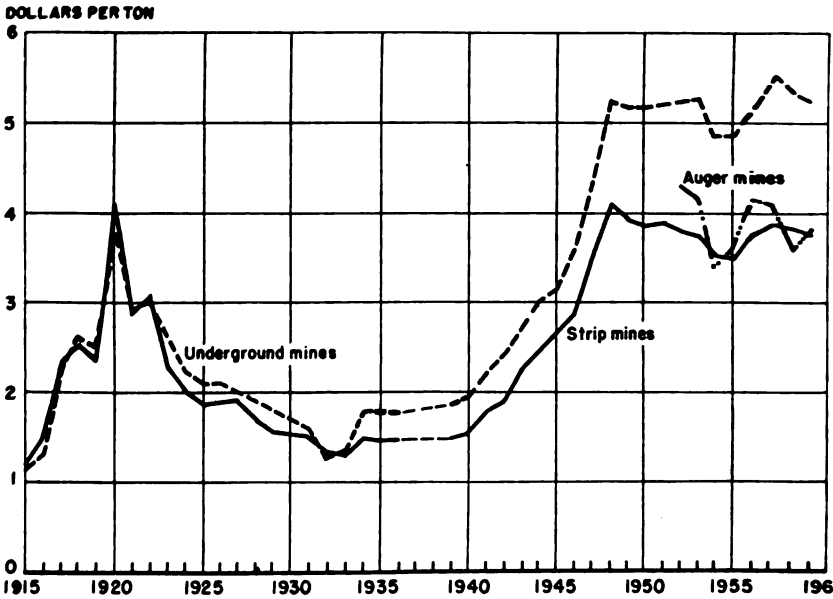

FIGURE 10.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, 1915–59, by underground, strip, and auger mines.

TABLE 26.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States, 1946–59

Year	Number of mines	Production		Number of power drills		
		Quantity (net tons)	Percentage of total	Horizontal	Vertical	Total
1946	514	75,375,841	66.7	(1)	(1)	764
1947	598	95,915,346	68.8	(1)	(1)	875
1948	728	98,809,393	72.3	(1)	(1)	1,195
1949	756	78,146,655	73.7	(1)	(1)	1,256
1950	692	87,205,280	70.6	(1)	(1)	1,201
1951	650	85,331,204	72.5	737	388	1,125
1952	629	79,252,284	73.0	685	385	1,070
1953	603	80,259,365	76.1	639	409	1,048
1954	541	70,107,205	71.4	592	391	983
1955	564	85,623,050	74.4	582	371	953
1956	696	96,278,779	75.8	652	389	1,041
1957	722	96,418,089	77.7	640	464	1,104
1958	737	91,659,662	78.9	615	464	1,079
1959	697	95,716,153	79.1	580	487	1,067

[1] Data not available.

Digitized by Google

TABLE 27.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States, 1958–59, by States

State	Number of mines		Production at mines using power drills				Number of power drills					
			Quantity (net tons)		Percentage of total strip production		Horizontal		Vertical		Total	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	35	22	2,282,895	1,853,471	86.2	68.3	14	17	17	19	31	36
Alaska	7	5	557,836	482,670	100.0	89.0	3	4	13	8	16	12
Arkansas	7	7	266,945	257,262	95.6	99.6	7	5	3	5	10	10
Colorado	7	5	350,942	519,615	83.0	94.2	3	5	4	4	7	9
Illinois	41	44	17,772,835	19,731,384	86.6	90.0	37	35	31	37	68	72
Indiana	37	37	10,206,443	10,010,967	98.9	98.5	39	38	21	22	60	60
Iowa	24	25	892,678	910,811	96.2	95.8	25	24	11	14	36	38
Kansas	7	7	802,029	757,169	98.5	98.8	10	9	2	2	12	11
Kentucky:												
Eastern	31	34	1,192,011	990,066	57.7	58.2	23	32	10	8	33	40
Western	40	42	15,480,893	14,749,072	95.4	84.9	34	33	35	49	69	82
Total Kentucky	71	76	16,672,904	15,739,138	91.1	82.5	57	65	45	57	102	122
Maryland	4	7	113,568	211,791	23.1	38.6	----------	1	2	2	2	3
Missouri	12	13	2,026,583	1,951,741	81.7	73.9	18	16	3	4	21	20
Montana:												
Bituminous	2	----------	20,241	----------	77.1	----------	----------	----------	3	----------	3	----------
Lignite	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
Total Montana	2	----------	20,241	----------	77.1	----------	----------	----------	3	----------	3	----------
New Mexico	1	1	16,376	30,000	93.0	94.6	----------	1	1	----------	1	1
North Dakota (lignite)	5	6	592,384	474,116	25.6	19.7	4	4	1	3	5	7
Ohio	105	105	16,794,967	19,070,844	77.2	77.4	83	83	83	89	166	172
Oklahoma	12	10	1,190,483	969,673	94.4	82.2	10	8	6	7	16	15
Pennsylvania	183	191	10,897,910	12,690,063	55.3	62.5	143	141	118	130	261	271
South Dakota (lignite)	1	----------	19,571	----------	100.0	----------	1	----------	----------	----------	1	----------
Tennessee	31	24	1,117,727	784,086	56.8	57.5	30	24	8	5	38	29
Virginia	20	15	1,371,180	1,093,882	78.9	62.1	17	12	7	7	24	19
Washington	1	1	4,880	20,030	100.0	85.4	----------	----------	1	1	1	1
West Virginia	116	89	6,442,583	5,527,019	77.5	76.3	108	82	79	64	187	146
Wyoming	8	7	1,245,702	1,630,421	98.4	99.0	6	6	5	7	11	13
Total	737	697	91,659,662	94,716,153	78.9	79.1	615	580	464	487	1,079	1,067

Digitized by Google

TABLE 28.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1948–59 [1]

Year	Strip mines reporting method of haulage							Strip mines not reporting method of haulage-production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Quantity (net tons)	Percentage of total strip production		
1948	97,450,399	7,214	9.4	3.7	6,327,989	103,778,388	74.4	35,727,532	139,505,920
1949	73,229,556	6,694	10.1	3.7	5,365,432	78,594,988	74.1	27,450,311	106,045,299
1950	88,666,733	6,564	10.3	3.8	4,364,333	93,031,066	75.3	30,435,498	123,466,564
1951	87,427,029	6,173	10.6	4.0	2,424,994	89,852,023	76.4	27,765,653	117,617,676
1952	88,589,637	5,799	11.3	4.0	2,296,744	90,886,381	83.5	18,023,375	108,909,756
1953	84,764,694	5,287	12.2	4.0	2,104,609	86,869,303	82.4	18,579,266	105,448,569
1954	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250
1955	94,150,171	4,798	13.3	3.9	2,290,600	96,440,771	83.9	18,651,998	115,092,769
1956	103,127,374	5,432	13.3	4.4	1,056,627	104,184,001	82.0	22,871,381	127,055,382
1957	104,796,728	5,532	14.0	4.3	164,311	104,961,039	84.6	19,147,499	124,108,538
1958	99,223,676	5,151	14.5	4.4	19,241	99,242,917	85.4	16,998,870	116,241,787
1959	102,706,819	4,959	15.3	4.6	----------	102,706,819	84.9	18,246,515	120,953,334

[1] Excludes lignite in 1948 and 1949.

Digitized by Google

TABLE 29.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1959, by States

State	Strip mines reporting method of haulage						Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)	Quantity (net tons)	Percentage of total strip production		
Alabama	2,047,025	104	16.6	4.3	2,047,025	75.4	666,569	2,713,594
Alaska	542,211	38	15.2	3.1	542,211	100.0		542,211
Arkansas	258,369	38	7.7	3.2	258,369	100.0		258,369
Colorado	525,220	24	18.7	2.2	525,220	95.2	26,608	551,828
Illinois	21,810,881	423	26.3	3.7	21,810,881	99.5	101,116	21,911,997
Indiana	9,790,459	172	28.8	3.8	9,790,459	96.4	369,024	10,159,483
Iowa	885,278	77	9.9	4.0	885,278	93.1	65,878	951,156
Kansas	760,575	26	22.5	2.3	760,575	99.3	5,420	765,995
Kentucky	15,640,622	524	14.6	3.3	15,640,622	82.0	3,439,923	19,080,545
Maryland	245,395	43	14.7	4.4	245,395	44.8	302,689	548,084
Missouri	1,988,669	82	25.7	3.1	1,988,669	75.3	653,058	2,641,727
Montana:								
Bituminous	8,345	5	6.4	.2	8,345	92.7	653	8,998
Lignite	177,378	5	13.6	1.0	177,378	98.8	2,086	179,464
Total Montana	185,723	10	10.0	1.0	185,723	98.5	2,739	188,462
New Mexico	31,722	5	7.0	.8	31,722	100.0		31,722
North Dakota (lignite)	2,339,642	89	13.8	2.4	2,339,642	97.1	69,725	2,409,367
Ohio	20,569,057	826	15.0	6.3	20,569,057	83.4	4,083,923	24,652,980
Oklahoma	969,673	80	11.6	5.8	969,673	82.2	210,077	1,179,750
Pennsylvania	16,556,348	1,777	11.9	5.4	16,556,348	81.5	3,750,638	20,306,986
South Dakota (lignite)	22,125	3	6.0	1.0	22,125	100.0		22,125
Tennessee	41,628	10	10.0	16.0	41,628	3.1	1,322,073	1,363,701
Virginia	1,106,954	84	11.0	5.9	1,106,954	62.9	653,705	1,760,659
Washington	23,443	6	8.7	1.1	23,443	100.0		23,443
West Virginia	5,185,011	494	14.6	6.8	5,185,011	71.6	2,057,858	7,242,869
Wyoming	1,180,789	24	22.1	1.4	1,180,789	71.7	465,492	1,646,281
Total	102,706,819	4,959	15.3	4.6	102,706,819	84.9	18,246,515	120,953,334

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:						
Blount	4	221,755	92	217	19,942	11.12
Cullman	3	60,740	32	147	4,771	12.73
Jefferson	8	340,132	115	192	22,058	15.42
Marion	2	90,477	35	236	8,293	10.91
Tuscaloosa	8	661,533	215	175	37,587	17.60
Walker	13	1,226,420	277	209	57,795	21.22
Winston	1	112,537	28	219	6,150	18.30
Total Alabama	39	2,713,594	794	197	156,596	17.33
Alaska	6	542,211	152	236	35,837	15.13
Arkansas:						
Franklin	1	35,528	10	151	1,510	23.53
Johnson	4	124,449	81	123	9,908	12.56
Pope	1	66,708	20	304	6,075	10.98
Sebastian	2	31,684	30	192	5,761	5.50
Total Arkansas	8	258,369	141	165	23,254	11.11
Colorado:						
El Paso	1	4,392	3	145	435	10.10
Fremont	2	44,454	11	143	1,596	27.86
Jackson	(1)	(1)	(1)	(1)	(1)	(1)
Montrose	(1)	(1)	(1)	(1)	(1)	(1)
Routt	3	347,764	82	187	15,354	22.65
Other counties	2	155,218	27	105	2,847	54.52
Total Colorado	8	551,828	123	164	20,232	27.28
Illinois:						
Adams	1	37,087	16	179	2,864	12.95
Brown	1	1,482	4	96	383	3.87
Bureau	(1)	(1)	(1)	(1)	(1)	(1)
Fulton	12	5,087,610	774	255	197,424	25.77
Gallatin	(1)	(1)	(1)	(1)	(1)	(1)
Greene	1	7,433	2	315	630	11.80
Jackson	2	608,108	109	252	27,491	22.12
Jefferson	1	23,180	12	215	2,581	8.98
Kankakee	(1)	(1)	(1)	(1)	(1)	(1)
Knox	4	2,196,359	273	209	57,033	38.51
La Salle	1	6,756	15	73	1,093	6.18
Livingston	1	1,181	4	150	600	1.97
Mercer	(1)	(1)	(1)	(1)	(1)	(1)
Peoria	5	299,904	64	203	13,000	23.07
Perry	5	3,506,532	535	264	141,335	24.81
Randolph	2	186,954	18	289	5,164	36.20
St. Clair	(1)	(1)	(1)	(1)	(1)	(1)
Saline	6	1,398,460	324	219	70,952	19.71
Schuyler	(1)	(1)	(1)	(1)	(1)	(1)
Vermilion	5	1,153,522	152	256	38,918	29.64
Wabash	1	1,317	2	131	262	5.03
Will	(1)	(1)	(1)	(1)	(1)	(1)
Williamson	11	2,388,821	323	225	72,609	32.90
Other counties	12	5,007,291	733	218	159,534	31.39
Total Illinois	71	21,911,997	3,360	236	791,873	27.67
Indiana:						
Clay	10	896,566	180	250	45,076	19.89
Fountain	1	27,312	19	220	4,176	6.54
Greene	6	1,518,093	332	204	67,742	22.41
Knox	(1)	(1)	(1)	(1)	(1)	(1)
Martin	1	31,429	10	233	2,330	13.49
Owen	(1)	(1)	(1)	(1)	(1)	(1)
Parke	(1)	(1)	(1)	(1)	(1)	(1)
Pike	(1)	(1)	(1)	(1)	(1)	(1)
Spencer	2	75,277	26	182	4,681	16.08
Sullivan	2	84,567	41	155	6,349	13.32
Vermillion	1	23,028	45	35	1,589	14.49
Vigo	(1)	(1)	(1)	(1)	(1)	(1)
Warrick	8	4,468,336	370	262	96,990	46.07
Other counties	14	3,034,875	599	237	142,187	21.34
Total Indiana	45	10,159,483	1,622	229	371,120	27.38

[1] See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Iowa:						
Appanoose	1	18,119	4	96	384	47.18
Keokuk	1	1,930	4	90	360	5.36
Lucas	1	4,488	2	160	320	14.03
Mahaska	8	225,956	60	277	16,639	13.58
Marion	12	601,034	123	245	30,218	19.89
Monroe	3	35,469	10	210	2,100	16.89
Polk	1	1,519	2	35	70	21.70
Van Buren	1	17,094	8	156	1,248	13.70
Wapello	3	43,150	14	292	4,094	10.54
Warren	1	2,397	2	150	300	7.99
Total Iowa	32	951,156	229	243	55,733	17.07
Kansas:						
Bourbon	1	4,008	4	224	895	4.48
Cherokee	4	488,073	118	260	30,696	15.90
Coffey	1	2,230	2	154	308	7.24
Crawford	4	269,494	75	274	20,494	13.15
Osage	1	2,190	2	151	302	7.25
Total Kansas	11	765,995	201	262	52,695	14.54
Kentucky, Eastern:						
Bell	19	408,885	148	129	19,152	21.35
Boyd	1	30,186	40	60	2,384	12.66
Carter	1	5,700	6	95	570	10.00
Clay	12	176,689	71	185	13,078	13.51
Harlan	4	24,488	17	78	1,303	18.79
Knott	1	4,000	4	100	400	10.00
Knox	1	10,372	4	140	519	20.00
Laurel	5	243,598	126	131	16,448	14.81
Lee	1	2,600	4	10	36	72.50
Leslie	(1)	(1)	(1)	(1)	(1)	(1)
Letcher	3	220,231	51	226	11,524	19.11
McCreary	2	100,794	126	49	6,172	16.33
Magoffin	3	54,104	36	175	6,321	8.56
Morgan	5	91,703	57	96	5,501	16.67
Owsley	2	41,823	14	149	2,091	20.00
Perry	(1)	(1)	(1)	(1)	(1)	(1)
Pulaski	3	128,006	17	259	4,396	29.12
Rockcastle	3	53,816	23	162	3,803	14.15
Whitley	11	85,681	185	49	9,048	9.47
Wolfe	1	2,000	2	75	133	15.00
Other counties	3	15,515	20	22	432	35.91
Total Eastern Kentucky	81	1,700,191	951	109	103,311	16.46
Kentucky, Western:						
Butler	3	140,372	35	132	4,621	30.38
Caldwell	1	35,857	13	228	2,968	12.08
Christian	2	36,061	21	116	2,435	14.81
Daviess	2	763,239	65	294	19,138	39.88
Hancock	1	5,367	3	91	274	19.59
Hopkins	17	4,445,273	513	246	126,286	35.20
McLean	1	1,200	2	60	120	10.00
Muhlenberg	10	7,458,358	675	249	167,981	44.40
Ohio	11	3,162,774	284	263	74,664	42.36
Union	1	77,731	10	220	2,200	35.33
Webster	5	1,254,122	231	221	51,147	24.52
Total Western Kentucky	54	17,380,354	1,852	244	451,834	38.47
Total Kentucky	135	19,080,545	2,803	198	555,145	34.37
Maryland:						
Allegany	19	155,667	78	188	14,713	10.58
Garrett	18	392,417	120	198	23,768	16.51
Total Maryland	37	548,084	198	194	38,481	14.24

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Missouri:						
Barton	(1)	(1)	(1)	(1)	(1)	(1)
Bates	1	1,596	3	75	226	7.06
Callaway	(1)	(1)	(1)	(1)	(1)	(1)
Clark	1	10,902	9	192	1,728	6.31
Dade	1	17,000	9	285	2,564	6.63
Henry	(1)	(1)	(1)	(1)	(1)	(1)
Linn	(1)	(1)	(1)	(1)	(1)	(1)
Macon	(1)	(1)	(1)	(1)	(1)	(1)
Putnam	1	91,881	20	280	5,599	16.41
Ralls	1	4,000	6	100	600	6.67
Randolph	(1)	(1)	(1)	(1)	(1)	(1)
St. Clair	2	278,726	57	258	14,678	18.99
Schuyler	1	18,940	6	200	1,200	15.78
Vernon	4	87,957	30	187	5,610	15.68
Other counties	16	2,130,725	1,867	108	201,143	10.59
Total Missouri	28	2,641,727	2,007	116	233,348	11.32
Montana (bituminous):						
Carbon	(1)	(1)	(1)	(1)	(1)	(1)
Rosebud	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	3	8,998	14	201	2,808	3.20
Total Montana (bituminous)	3	8,998	14	201	2,808	3.20
Montana (lignite):						
Dawson	(1)	(1)	(1)	(1)	(1)	(1)
Richland	(1)	(1)	(1)	(1)	(1)	(1)
Sheridan	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	4	179,464	21	225	4,735	37.90
Total Montana (lignite)	4	179,464	21	225	4,735	37.90
Total Montana	7	188,462	35	216	7,543	24.99
New Mexico: McKinley	3	31,722	14	256	3,584	8.85
North Dakota (lignite):						
Adams	1	20,310	8	192	1,536	13.22
Bowman	1	157,609	12	231	2,777	56.76
Burke	2	399,297	46	232	10,676	37.40
Burleigh	1	14,382	3	204	612	23.50
Divide	1	207,370	35	244	8,556	24.24
Dunn	2	6,135	6	150	900	6.82
Grant	4	24,305	5	157	787	30.88
Hettinger	2	6,811	13	89	1,156	5.89
McLean	3	91,560	23	148	3,413	26.83
Mercer	4	925,057	100	214	21,438	43.15
Morton	4	24,066	10	184	1,840	13.08
Oliver	2	10,748	3	127	380	28.28
Stark	3	62,953	6	197	1,182	53.26
Ward	4	458,764	48	233	11,198	40.97
Total North Dakota (lignite)	34	2,409,367	318	209	66,451	36.26
Ohio:						
Athens	(1)	(1)	(1)	(1)	(1)	(1)
Belmont	26	2,080,169	523	163	85,183	24.42
Carroll	10	299,255	67	270	18,006	16.62
Columbiana	26	1,426,312	317	274	86,917	16.41
Coshocton	9	1,534,796	255	274	69,954	21.94
Gallia	7	666,683	126	255	32,021	20.82
Guernsey	7	218,805	94	142	13,285	16.47
Harrison	10	5,063,029	676	237	160,273	31.59
Hocking	5	33,576	27	110	2,945	11.40
Holmes	3	92,770	21	171	3,600	25.77
Jackson	12	223,439	58	228	13,143	17.00
Jefferson	25	2,243,666	429	258	110,798	20.25
Lawrence	4	291,099	50	243	12,149	23.96
Mahoning	17	904,553	175	285	49,948	18.11
Meigs	3	392,610	80	230	18,441	21.29
Morgan	4	2,364,384	250	253	63,151	37.44
Muskingum	6	311,400	58	214	12,347	25.22
Noble	9	1,393,431	166	220	36,420	38.26

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Ohio—Continued						
Perry	12	2,025,726	326	253	82,380	24.59
Portage	2	108,420	28	294	8,226	13.18
Stark	15	566,691	131	267	35,046	16.17
Tuscarawas	31	1,823,575	513	228	116,971	15.59
Vinton	6	201,647	93	263	24,442	8.25
Washington	(1)	(1)	(1)	(1)	(1)	(1)
Wayne	2	86,897	22	195	4,287	20.27
Other counties	7	300,047	81	208	16,815	17.84
Total Ohio	258	24,652,980	4,566	236	1,076,748	22.90
Oklahoma:						
Craig	4	124,036	41	241	9,868	12.57
Haskell	4	276,163	99	152	15,074	18.32
Le Flore	(1)	(1)	(1)	(1)	(1)	(1)
McIntosh	(1)	(1)	(1)	(1)	(1)	(1)
Nowata	1	5,669	4	50	200	28.35
Rogers	(1)	(1)	(1)	(1)	(1)	(1)
Sequoyah	1	161,631	29	276	8,013	20.17
Other counties	4	612,251	210	173	36,358	16.84
Total Oklahoma	14	1,179,750	383	181	69,513	16.97
Pennsylvania:						
Allegheny	27	562,506	158	191	30,145	18.66
Armstrong	36	1,312,151	291	336	97,776	13.42
Beaver	24	252,465	71	184	12,974	19.46
Bedford	4	61,351	21	188	4,026	15.24
Blair	(1)	(1)	(1)	(1)	(1)	(1)
Bradford	1	6,798	3	215	645	10.54
Butler	38	1,736,035	360	239	86,028	20.18
Cambria	27	481,595	244	160	39,027	12.34
Cameron	1	50,887	23	233	5,362	9.49
Centre	18	670,026	239	223	53,219	12.59
Clarion	31	2,832,050	588	269	158,304	17.89
Clearfield	106	4,846,473	1,472	233	342,992	14.13
Clinton	6	623,816	118	261	30,836	20.23
Elk	7	133,890	58	165	9,619	13.92
Fayette	31	335,352	128	134	17,092	19.62
Greene	3	7,243	6	37	222	32.63
Huntingdon	5	44,266	35	129	4,517	9.80
Indiana	33	1,031,364	336	204	68,575	15.04
Jefferson	29	660,661	257	173	44,489	14.85
Lawrence	28	995,981	198	246	48,799	20.41
Lycoming	2	42,870	15	201	2,944	14.56
McKean	3	42,293	17	164	2,793	15.14
Mercer	7	483,437	184	176	32,424	14.91
Somerset	54	1,100,925	312	178	55,490	19.84
Tioga	(1)	(1)	(1)	(1)	(1)	(1)
Venango	13	552,260	115	245	28,119	19.64
Washington	21	974,903	267	201	53,596	18.19
Westmoreland	23	160,016	58	112	6,460	24.77
Other counties	11	305,372	94	207	19,489	15.67
Total Pennsylvania	589	20,306,986	5,668	222	1,255,962	16.17
South Dakota (lignite): Dewey	1	22,125	9	252	2,269	9.75
Tennessee:						
Anderson	11	221,556	49	154	7,515	29.48
Campbell	16	262,097	143	109	15,601	16.80
Claiborne	3	18,914	46	65	3,012	6.28
Cumberland	2	50,144	33	113	3,734	13.43
Fentress	4	25,009	106	59	6,252	4.00
Grundy	(1)	(1)	(1)	(1)	(1)	(1)
Hamilton	2	9,871	24	20	489	20.19
Marion	4	185,380	135	65	8,765	21.15
Morgan	14	270,125	56	189	10,585	25.52
Scott	7	138,297	42	165	6,922	19.98
Sequatchie	(1)	(1)	(1)	(1)	(1)	(1)
Van Buren	2	15,408	8	100	823	18.73
Other counties	4	166,900	43	183	7,877	21.19
Total Tennessee	69	1,363,701	685	104	71,575	19.05

See footnote at end of table.

Digitized by Google

TABLE 21.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors and number and length of units in use in the United States, 1945–59 [1]

Year	Number of mines	Production (net tons)	Number of units in use	Average length (feet)	Total length (miles)
1945	117	40,189,857	359	1,438	97.6
1946	161	46,022,710	457	1,484	128.5
1947	199	70,690,920	594	1,470	165.3
1948	270	81,821,361	755	1,460	208.8
1949	314	69,947,713	860	1,514	246.7
1950	374	92,413,644	1,013	1,538	294.9
1951	372	99,643,003	1,094	1,568	325.0
1952	358	92,168,992	1,066	1,526	308.2
1953	322	100,155,249	1,042	1,541	303.9
1954	291	83,211,284	1,081	1,626	332.9
1955	314	97,677,313	1,002	1,682	319.6
1956	314	126,717,518	1,114	1,656	349.4
1957	362	136,914,192	1,233	1,672	390.4
1958	366	115,419,740	1,235	1,711	400.3
1959	371	126,654,911	1,416	1,723	462.1

[1] Includes all gathering and haulage conveyors with capacity over 500 feet, except main-slope conveyors. Excludes lignite and Virginia semianthracite mines in 1945–49.

TABLE 22.—Number and production of underground bituminous coal and lignite mines using gathering and haulage conveyors, and number and length of units in use in the United States, 1958–59, by States [1]

State	Number of mines		Production (net tons)		Number of units in use		Average length (feet)		Total length (miles)	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	8	8	5,080,548	3,768,239	42	46	1,784	1,723	14.2	15.0
Alaska		1		98,903		1		1,800		.3
Arkansas	2	1	14,606	72,598	4	3	800	1,000	.6	.6
Colorado	4	5	710,319	758,121	14	19	1,643	1,458	4.4	5.2
Illinois	13	14	14,102,538	18,017,450	99	116	1,968	2,027	36.9	44.5
Indiana	3	4	960,008	1,217,241	8	14	975	1,314	1.5	3.5
Kentucky	50	42	18,765,507	17,647,067	159	180	2,227	1,574	67.1	53.7
Ohio	9	12	3,352,267	5,109,493	21	28	1,676	1,421	6.7	7.5
Pennsylvania	64	69	16,403,953	19,988,299	241	316	1,713	1,632	78.2	97.7
Tennessee	6	5	678,748	680,725	20	19	1,596	1,474	6.0	5.3
Utah	15	21	2,877,411	3,366,642	36	43	1,155	1,608	7.9	13.1
Virginia	11	10	2,891,018	2,698,616	35	47	1,800	1,989	11.9	17.7
Washington	1	1	45,611	24,283	2	2	3,500	3,500	1.3	1.3
West Virginia	178	174	49,485,807	53,078,838	550	575	1,561	1,791	162.6	195.0
Wyoming	2	4	51,399	128,396	4	7	1,275	1,043	1.0	1.4
Total	366	371	115,419,740	126,654,911	1,235	1,416	1,711	1,723	400.3	461.8

[1] Includes all mines using belt conveyors, other than main-slope conveyors, 500 feet or more long for transporting coal underground.

STRIP MINING

Strip mines have two substantial advantages over underground mines: (1) The output per man per day in strip mines is more than double that in underground mines, and (2) the average cost of strip coal, f.o.b. mines, is about one-third lower than that of coal from underground mines. See figures 9 and 10.

The rapid growth of strip mining was made possible by the development of larger and improved stripping and drilling equipment and

Digitized by Google

trucks. The most notable recent change in stripping equipment has been replacement of virtually all steam shovels by diesel-powered and large electric shovels and draglines.

An increase in the average capacity of trucks used in strip mines has reduced the number required. The average hauling distance from strip mines to tipples or ramps has remained approximately 4 miles.

The average thickness of overburden at all bituminous coal and lignite strip mines in the United States was 42 feet in 1955, the latest year for which figures are available. Several strip mines handled an average of more than 60 feet of overburden in 1955, and a few handled more than 70 feet.

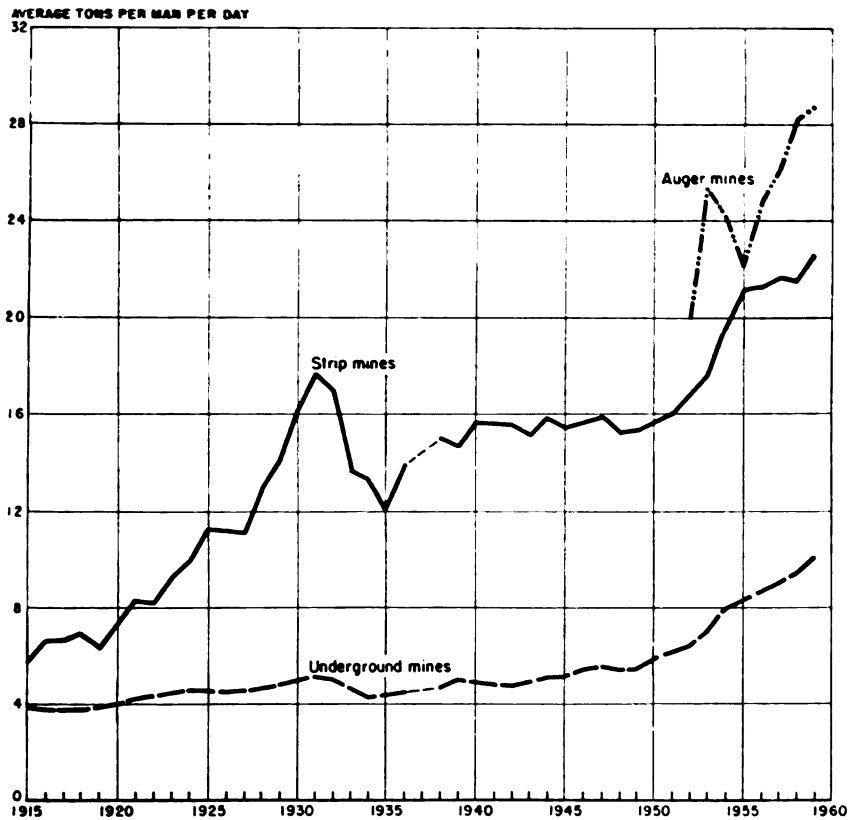

FIGURE 9.—Average tons per man per day at bituminous coal and lignite mines in the United States, 1915–59, by underground, strip, and auger mines.

Digitized by Google

TABLE 23.—Growth of strip mining at bituminous coal and lignite mines in the United States, 1914–59, compared with underground and auger mining

Year	Production (thousand net tons)				Percentage of total mined by stripping	Average tons per man per day				Average value per ton f.o.b. mine				Number of strip mines	Number of power shovels and draglines
	Underground mines	Strip mines [1]	Auger mines	Total		Underground mines	Strip mines [1]	Auger mines	Total	Underground mines	Strip mines [1]	Auger mines	Total		
1914	421,423	1,281		422,704	0.3	3.71	5.06		3.71	(2)	(2)		$1.17	[3] 35	48
1915	439,792	2,832		442,624	.6	3.90	5.81		3.91	$1.13	$1.18		1.13	[3] 60	87
1916	498,587	3,933		502,520	.8	3.88	6.67		3.90	1.32	1.51		1.32	[3] 79	111
1917	546,001	5,790		551,791	1.0	3.75	6.52		3.77	2.26	2.34		2.26	[3] 126	182
1918	571,098	8,288		579,386	1.4	3.76	6.81		3.78	2.58	2.54		2.58	[3] 165	276
1919	460,225	5,635		465,860	1.2	3.82	6.21		3.84	2.49	2.33		2.49	[3] 168	287
1920	559,807	8,860		568,667	1.5	3.97	7.20		4.00	3.74	4.12		3.75	[3] 174	312
1921	410,865	5,057		415,922	1.2	4.18	8.28		4.20	2.89	2.87		2.89	[3] 155	279
1922	412,059	10,209		422,268	2.4	4.24	8.09		4.28	3.02	3.07		3.02	272	379
1923	552,625	11,940		564,565	2.1	4.43	9.32		4.47	2.69	2.31		2.68	263	442
1924	470,080	13,607		483,687	2.8	4.50	9.91		4.56	2.20	2.00		2.20	234	420
1925	503,182	16,871		520,053	3.2	4.45	11.18		4.52	2.05	1.84		2.04	227	389
1926	556,444	16,923		573,367	3.0	4.42	11.13		4.50	2.07	1.89		2.06	237	410
1927	499,385	18,378		517,763	3.6	4.47	11.06		4.55	1.99	1.90		1.99	255	455
1928	480,956	19,780		500,735	4.0	4.61	13.02		4.73	1.87	1.69		1.86	250	415
1929	514,721	20,268		534,989	3.8	4.73	14.08		4.85	1.79	1.57		1.78	200	411
1930	447,684	19,842		467,526	4.3	4.93	16.21		5.06	1.71	1.54		1.70	218	341
1931	363,157	18,932		382,089	5.0	5.12	17.68		5.30	1.54	1.51		1.54	235	314
1932	290,069	19,641		309,710	6.3	4.90	16.95		5.22	1.31	1.32		1.31	255	332
1933	315,360	18,270		333,630	5.5	4.60	13.59		4.78	1.34	1.33		1.34	289	389
1934	338,578	20,790		359,368	5.8	4.23	13.28		4.40	1.76	1.49		1.75	344	458
1935	348,726	23,647		372,373	6.4	4.32	12.01		4.50	1.79	1.47		1.77	368	507
1936	410,962	28,126		439,088	6.4	4.42	13.91		4.62	1.77	1.49		1.76	381	562
1937	413,780	31,751		445,531	7.1	(2)	(2)		4.69	(2)	(2)		1.94	449	(3)
1938	318,138	30,407		348,545	8.7	4.60	15.00		4.89	(2)	(2)		1.95	465	737
1939	357,133	37,722		394,855	9.6	4.92	14.68		5.25	1.88	1.49		1.84	537	914
1940	417,604	43,167		460,771	9.4	4.86	15.63		5.19	1.94	1.56		1.91	638	1,071
1941	459,078	55,071		514,149	10.7	4.83	15.59		5.20	2.23	1.79		2.19	769	1,321
1942	515,490	67,203		582,693	11.5	4.74	15.52		5.12	2.41	1.90		2.36	834	1,438
1943	510,492	79,685		590,177	13.5	4.89	15.15		5.38	2.75	2.28		2.69	1,004	1,830
1944	518,678	100,898		619,576	16.3	5.04	15.89		5.67	3.01	2.48		2.92	1,240	2,312

Digitized by Google

1945	467,630	109,987	----------	577,617	19.0	5.04	15.46	----------	5.78	3.16	2.65	----------	3.06	1,370	2,439
1946	420,958	112,964	----------	533,922	21.1	5.43	15.73	----------	6.30	3.59	2.87	----------	3.44	1,445	2,744
1947	491,229	139,395	----------	630,624	22.1	5.49	15.93	----------	6.42	4.35	3.47	----------	4.16	1,750	3,254
1948	460,012	139,506	----------	599,518	23.3	5.31	15.28	----------	6.26	5.26	4.11	----------	4.99	1,971	3,712
1949	331,823	106,045	----------	437,868	24.2	5.42	15.33	----------	6.43	5.18	3.94	----------	4.88	1,761	3,576
1950	392,844	123,467	----------	516,311	23.9	5.75	15.66	----------	6.77	5.15	3.87	----------	4.84	1,870	3,877
1951	416,047	117,618	----------	533,665	22.0	6.08	16.02	----------	7.04	5.21	3.88	----------	4.92	1,784	3,810
1952	356,425	108,910	1,506	466,841	23.3	6.37	16.77	20.07	7.47	5.24	3.81	$4.31	4.90	1,643	3,527
1953	349,551	105,448	2,291	457,290	23.1	7.01	17.62	25.30	8.17	5.27	3.75	4.15	4.92	1,554	3,390
1954	289,112	98,134	4,460	391,706	25.1	7.99	19.64	24.12	9.47	4.87	3.52	3.41	4.52	1,329	3,409
1955	343,465	115,093	6,075	464,633	24.8	8.28	21.12	22.22	9.84	4.86	3.48	3.60	4.50	1,617	3,265
1956	365,774	127,055	8,045	500,874	25.4	8.62	21.18	24.85	10.28	5.20	3.74	4.17	4.82	1,728	3,705
1957	360,649	124,109	7,946	492,704	25.2	8.91	21.64	26.19	10.59	5.52	3.89	4.12	5.08	1,756	3,723
1958	286,884	116,242	7,320	410,446	28.3	9.38	21.54	28.15	11.33	5.33	3.80	3.60	4.86	1,646	3,515
1959	283,434	120,953	7,641	412,028	29.4	10.08	22.65	28.77	12.22	5.23	3.76	3.83	4.77	1,594	3,417

[1] Includes power strip pits proper and excludes horse stripping operations and mines combining stripping and underground in the same operation for the period 1914–42. The years 1943–59 include data on all strip mines.

[2] Data not available.

[3] Exclusive of horse stripping operations.

Digitized by Google

TABLE 24.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1932–59

Year	Number of strip mines	Production (thousand net tons)	Number of power shovels and dragline excavators											Number of carry-all scrapers	Number of bulldozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total		
			Electric	Diesel-electric	Diesel	Gasoline	Steam	Less than 3	3–5, inclusive	6–12, inclusive	More than 12	Power shovels	Dragline excavators			
1932	255	19,641	[1] 105	(2)	[3] 61	(4)	166	(5)	(5)	(5)	(5)	(5)	(5)	332	(5)	(5)
1933	289	18,270	[1] 117	(2)	[3] 103	(4)	169	(5)	(5)	(5)	(5)	(5)	(5)	389	(5)	(5)
1934	344	20,790	[1] 121	(2)	[3] 149	(4)	188	(5)	(5)	(5)	(5)	(5)	(5)	458	(5)	(5)
1935	368	23,647	[1] 139	(2)	[3] 194	(4)	174	(5)	(5)	(5)	(5)	(5)	(5)	507	(5)	(5)
1936	381	28,126	[1] 151	(2)	[3] 223	(4)	188	(5)	(5)	(5)	(5)	(5)	(5)	562	(5)	(5)
1937	449	31,751	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
1938	465	30,407	[1] 155	(2)	[3] 440	(4)	142	(5)	(5)	(5)	(5)	(5)	(5)	737	(5)	(5)
1939	537	37,722	[1] 184	(2)	[3] 524	(4)	206	(5)	(5)	(5)	(5)	(5)	(5)	914	(5)	(5)
1940	638	43,167	[1] 194	(2)	[3] 697	(4)	180	(5)	(5)	(5)	(5)	(5)	(5)	1,071	(5)	(5)
1941	769	55,071	[1] 210	(2)	[3] 911	(4)	200	1,009	153	95	64	(5)	(5)	1,321	(5)	(5)
1942	834	67,203	[1] 219	(2)	[3] 1,020	(4)	199	1,114	159	97	68	(5)	(5)	1,438	(5)	(5)
1943	1,004	79,685	[1] 234	(2)	[3] 1,433	(4)	172	1,488	173	106	72	(5)	(5)	1,839	(5)	(5)
1944	1,240	100,898	[1] 244	(2)	[3] 1,902	(4)	166	1,900	225	113	74	(5)	(5)	2,312	(5)	(5)
1945	1,370	109,987	[1] 256	(2)	[3] 2,042	(4)	141	2,004	243	117	75	(5)	(5)	2,439	(5)	(5)
1946	1,445	112,964	[1] 261	(2)	1,619	753	111	2,256	302	112	74	2,406	338	2,744	263	(5)
1947	1,750	139,395	[1] 301	(2)	2,279	591	83	2,685	362	123	84	2,822	432	3,254	275	(5)
1948	1,971	139,506	[1] 337	(2)	2,675	646	54	3,048	446	130	88	3,177	535	3,712	362	(5)
1949	1,761	106,045	[1] 352	(2)	2,646	527	51	2,931	367	168	110	3,011	565	3,576	320	(5)
1950	1,870	123,467	[1] 348	(2)	2,880	607	42	3,182	416	170	109	3,247	630	3,877	286	(5)
1951	1,784	117,618	[1] 346	(2)	2,905	533	26	3,088	420	187	115	3,164	646	3,810	220	(5)
1952	1,643	108,910	[1] 321	(2)	2,642	545	19	2,800	425	183	119	2,892	635	3,527	218	(5)
1953	1,554	105,448	[1] 317	(2)	2,629	446	17	2,692	413	193	111	2,793	616	3,409	244	1,954
1954	1,329	98,134	[1] 381	(2)	2,617	374	18	2,480	579	211	120	2,605	785	3,390	269	2,599
1955	1,617	115,093	[1] 315	(2)	2,603	337	10	2,381	550	223	111	2,592	673	3,265	187	2,106
1956	1,728	127,055	285	136	2,914	365	5	2,693	634	249	129	2,899	806	3,705	226	2,381
1957	1,756	124,109	325	164	2,839	389	6	2,748	566	266	143	2,894	829	3,723	215	2,499
1958	1,646	116,242	315	273	2,607	315	5	2,507	591	275	142	2,704	811	3,515	173	2,472
1959	1,594	120,953	309	215	2,579	307	7	2,435	572	267	143	2,607	810	3,417	161	2,443

[1] Includes diesel-electric shovels.
[2] Included with electric shovels.
[3] Includes gasoline shovels.
[4] Included with diesel shovels.
[5] Data not available.

Digitized by Google

TABLE 25.—Number and production of bituminous coal and lignite strip mines and units of stripping and loading equipment in use in the United States, 1959, by States

State	Number of strip mines	Production (net tons)	Number of power shovels and dragline excavators											Number of carry-all scrapers	Number of bull-dozers
			By type of power					By capacity of dipper or bucket, cubic yards				By type of machine		Total	
			Electric	Diesel-electric	Diesel	Gas	Steam	Less than 3	3–5, inclusive	6–12, inclusive	More than 12	Power shovels	Dragline excavators		
Alabama	39	2,713,594	13	4	82	-------	2	74	15	8	4	85	16	101	4	52
Alaska	6	542,211	-------	-------	16	-------	-------	16	-------	-------	-------	14	2	16	3	28
Arkansas	8	258,369	1	4	9	-------	-------	6	3	4	1	6	8	14	-------	11
Colorado	8	551,828	2	2	7	-------	-------	6	2	2	1	6	5	11	4	12
Illinois	71	21,911,997	93	10	65	8	-------	43	46	40	47	113	63	176	-------	110
Indiana	45	10,159,483	47	10	54	14	-------	47	37	20	21	73	52	125	6	94
Iowa	32	951,156	4	-------	41	20	-------	47	14	3	1	34	31	65	6	42
Kansas	11	765,995	5	1	8	1	1	9	2	2	3	7	9	16	1	15
Kentucky:																
Eastern	81	1,700,191	1	3	101	8	-------	98	14	1	-------	111	2	113	2	93
Western	54	17,380,354	36	6	94	6	-------	62	37	25	18	99	43	142	5	107
Total Kentucky	135	19,080,545	37	9	195	14	-------	160	51	26	18	210	45	255	7	200
Maryland	37	548,084	1	1	28	15	-------	42	3	-------	-------	40	5	45	-------	28
Missouri	28	2,641,727	17	3	16	12	2	25	11	5	9	34	16	50	-------	31
Montana:																
Bituminous	3	8,998	3	-------	-------	1	-------	1	-------	1	2	3	1	4	-------	2
Lignite	4	179,464	1	-------	1	1	-------	1	1	1	-------	2	1	3	1	4
Total Montana	7	188,462	4	-------	1	2	-------	2	1	2	2	5	2	7	1	6
New Mexico	3	31,722	-------	1	-------	1	-------	2	-------	-------	-------	2	-------	2	1	2
North Dakota (lignite)	34	2,409,367	20	4	21	14	-------	40	8	10	1	48	11	59	21	30
Ohio	258	24,652,980	43	43	428	72	-------	394	122	50	20	460	126	586	51	507
Oklahoma	14	1,179,750	5	11	9	-------	1	14	4	4	4	17	9	26	-------	11
Pennsylvania	589	20,306,986	10	87	1,152	107	-------	1,065	199	82	10	974	382	1,356	21	877
South Dakota (lignite)	1	22,125	-------	-------	1	1	-------	1	1	-------	-------	1	1	2	1	1
Tennessee	69	1,363,701	-------	2	86	12	-------	95	4	1	-------	94	6	100	1	69
Virginia	42	1,760,659	-------	6	61	8	-------	67	7	1	-------	75	-------	75	9	33
Washington	2	23,443	-------	-------	-------	1	-------	1	-------	-------	-------	1	-------	1	-------	3
West Virginia	147	7,242,869	3	15	293	3	-------	268	40	5	1	297	17	314	11	262
Wyoming	8	1,646,281	4	2	6	2	1	10	3	2	-------	11	4	15	13	16
Total	1,594	120,953,334	309	215	2,579	307	7	2,434	573	267	143	2,607	810	3,417	161	2,445

Digitized by Google

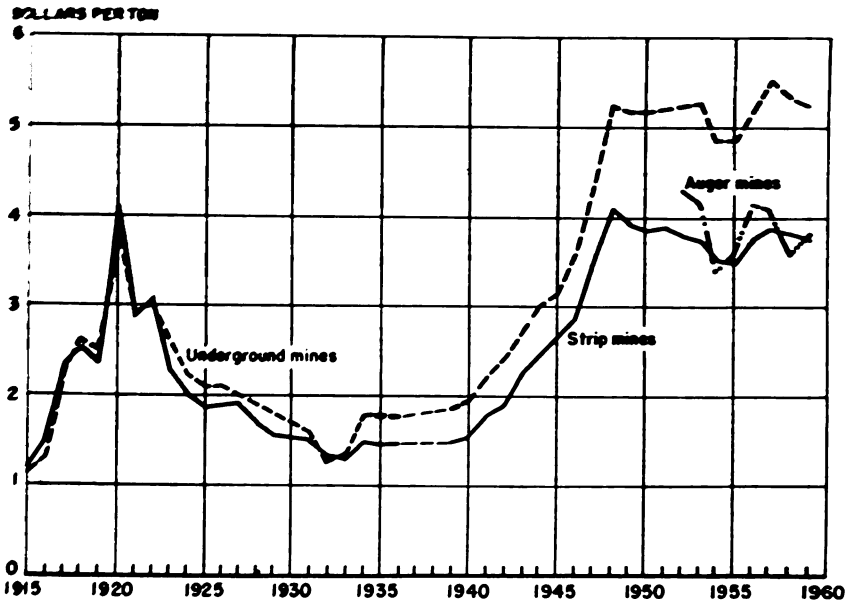

FIGURE 10.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, 1915–59, by underground, strip, and auger mines.

TABLE 26.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States, 1946–59

Year	Number of mines	Production		Number of power drills		
		Quantity (net tons)	Percentage of total	Horizontal	Vertical	Total
1946	514	75,375,841	66.7	(1)	(1)	764
1947	598	95,915,346	68.8	(1)	(1)	875
1948	728	98,809,393	72.3	(1)	(1)	1,195
1949	756	78,146,655	73.7	(1)	(1)	1,256
1950	692	87,205,280	70.6	(1)	(1)	1,201
1951	650	85,331,204	72.5	737	388	1,125
1952	629	79,252,284	73.0	685	385	1,070
1953	603	80,259,365	76.1	639	409	1,048
1954	541	70,107,205	71.4	592	391	983
1955	564	85,623,050	74.4	582	371	953
1956	606	96,278,779	75.8	652	389	1,041
1957	722	96,418,089	77.7	640	464	1,104
1958	737	91,659,662	78.9	615	464	1,079
1959	697	95,716,153	79.1	590	457	1,067

[1] Data not available.

Digitized by Google

TABLE 27.—Bituminous coal and lignite strip mines using power drills in bank or overburden in the United States, 1958–59, by States

State	Number of mines		Production at mines using power drills				Number of power drills					
			Quantity (net tons)		Percentage of total strip production		Horizontal		Vertical		Total	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	35	22	2,282,895	1,853,471	86.2	68.3	14	17	17	19	31	36
Alaska	7	5	557,836	482,670	100.0	89.0	3	4	13	8	16	12
Arkansas	7	7	266,945	257,262	95.6	99.6	7	5	3	5	10	10
Colorado	7	5	350,942	519,615	83.0	94.2	3	5	4	4	7	9
Illinois	41	44	17,772,835	19,731,384	86.6	90.0	37	35	31	37	68	72
Indiana	37	37	10,206,443	10,010,967	98.9	98.5	39	38	21	22	60	60
Iowa	24	25	892,678	910,811	96.2	95.8	25	24	11	14	36	38
Kansas	7	7	802,029	757,169	98.5	98.8	10	9	2	2	12	11
Kentucky:												
Eastern	31	34	1,192,011	990,066	57.7	58.2	23	32	10	8	33	40
Western	40	42	15,480,893	14,749,072	95.4	84.9	34	33	35	49	69	82
Total Kentucky	71	76	16,672,904	15,739,138	91.1	82.5	57	65	45	57	102	122
Maryland	4	7	113,568	211,791	23.1	38.6		1	2	2	2	3
Missouri	12	13	2,026,583	1,951,741	81.7	73.9	18	16	3	4	21	20
Montana:												
Bituminous	2		20,241		77.1				3		3	
Lignite												
Total Montana	2		20,241		77.1				3		3	
New Mexico	1	1	16,376	30,000	93.0	94.6		1	1		1	1
North Dakota (lignite)	5	6	592,384	474,116	25.6	19.7	4	4	1	3	5	7
Ohio	105	105	16,794,967	19,070,844	77.2	77.4	83	83	83	89	166	172
Oklahoma	12	10	1,190,483	969,673	94.4	82.2	10	8	6	7	16	15
Pennsylvania	183	191	10,897,910	12,690,063	55.3	62.5	143	141	118	130	261	271
South Dakota (lignite)	1		19,571		100.0		1				1	
Tennessee	31	24	1,117,727	784,086	56.8	57.5	30	24	8	5	38	29
Virginia	20	15	1,371,180	1,093,882	78.9	62.1	17	12	7	7	24	19
Washington	1	1	4,880	20,030	100.0	85.4			1	1	1	1
West Virginia	116	89	6,442,583	5,527,019	77.5	76.3	108	82	79	64	187	146
Wyoming	8	7	1,245,702	1,630,421	98.4	99.0	6	6	5	7	11	13
Total	737	697	91,659,662	94,716,153	78.9	79.1	615	580	464	487	1,079	1,067

Digitized by Google

TABLE 28.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1948–59 [1]

Year	Strip mines reporting method of haulage							Strip mines not reporting method of haulage-production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Strip mines using rail, rail and truck, truck and tram—production (net tons)	Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)		Quantity (net tons)	Percentage of total strip production		
1948	97,450,399	7,214	9.4	3.7	6,327,989	103,778,388	74.4	35,727,532	139,505,920
1949	73,229,556	6,694	10.1	3.7	5,365,432	78,594,988	74.1	27,450,311	106,045,299
1950	88,666,733	6,564	10.3	3.8	4,364,333	93,031,066	75.3	30,435,498	123,466,564
1951	87,427,029	6,173	10.6	4.0	2,424,994	89,852,023	76.4	27,765,653	117,617,676
1952	88,589,637	5,799	11.3	4.0	2,296,744	90,886,381	83.5	18,023,375	108,909,756
1953	84,764,694	5,287	12.2	4.0	2,104,609	86,869,303	82.4	18,579,266	105,448,569
1954	73,794,489	4,250	13.2	3.9	1,203,753	74,998,242	76.4	23,136,008	98,134,250
1955	94,150,171	4,798	13.3	3.9	2,290,600	96,440,771	83.9	18,651,998	115,092,769
1956	103,127,374	5,432	13.3	4.4	1,056,627	104,184,001	82.0	22,871,381	127,055,382
1957	104,796,728	5,532	14.0	4.3	164,311	104,961,039	84.6	19,147,499	124,108,538
1958	99,223,676	5,151	14.5	4.4	19,241	99,242,917	85.4	16,998,870	116,241,787
1959	102,706,819	4,959	15.3	4.6	----------	102,706,819	84.9	18,246,515	120,953,334

[1] Excludes lignite in 1948 and 1949.

Digitized by Google

TABLE 29.—Method of haulage from bituminous coal and lignite strip mines to tipple or ramp, in the United States, 1959, by States

State	Strip mines reporting method of haulage						Strip mines not reporting method of haulage—production (net tons)	Total strip production (net tons)
	Strip mines using trucks				Production of strip mines reporting			
	Production (net tons)	Number of trucks	Average capacity per truck (net tons)	Average distance hauled (miles)	Quantity (net tons)	Percentage of total strip production		
Alabama	2,047,025	104	16.6	4.3	2,047,025	75.4	666,569	2,713,594
Alaska	542,211	38	15.2	3.1	542,211	100.0		542,211
Arkansas	258,369	38	7.7	3.2	258,369	100.0		258,369
Colorado	525,220	24	18.7	2.2	525,220	95.2	26,608	551,828
Illinois	21,810,881	423	26.3	3.7	21,810,881	99.5	101,116	21,911,997
Indiana	9,790,459	172	28.8	3.8	9,790,459	96.4	369,024	10,159,483
Iowa	885,278	77	9.9	4.0	885,278	93.1	65,878	951,156
Kansas	760,575	26	22.5	2.3	760,575	99.3	5,420	765,995
Kentucky	15,640,622	524	14.6	3.3	15,640,622	82.0	3,439,923	19,080,545
Maryland	245,395	43	14.7	4.4	245,395	44.8	302,689	548,084
Missouri	1,988,669	82	25.7	3.1	1,988,669	75.3	653,058	2,641,727
Montana:								
Bituminous	8,345	5	6.4	.2	8,345	92.7	653	8,998
Lignite	177,378	5	13.6	1.0	177,378	98.8	2,086	179,464
Total Montana	185,723	10	10.0	1.0	185,723	98.5	2,739	188,462
New Mexico	31,722	5	7.0	.8	31,722	100.0		31,722
North Dakota (lignite)	2,339,642	89	13.8	2.4	2,339,642	97.1	69,725	2,409,367
Ohio	20,569,057	826	15.0	6.3	20,569,057	83.4	4,083,923	24,652,980
Oklahoma	969,673	80	11.6	5.8	969,673	82.2	210,077	1,179,750
Pennsylvania	16,556,348	1,777	11.9	5.4	16,556,348	81.5	3,750,638	20,306,986
South Dakota (lignite)	22,125	3	6.0	1.0	22,125	100.0		22,125
Tennessee	41,628	10	10.0	16.0	41,628	3.1	1,322,073	1,363,701
Virginia	1,106,954	84	11.0	5.9	1,106,954	62.9	653,705	1,760,659
Washington	23,443	6	8.7	1.1	23,443	100.0		23,443
West Virginia	5,185,011	494	14.6	6.8	5,185,011	71.6	2,057,858	7,242,869
Wyoming	1,180,789	24	22.1	1.4	1,180,789	71.7	465,492	1,646,281
Total	102,706,819	4,959	15.3	4.6	102,706,819	84.9	18,246,515	120,953,334

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Alabama:						
Blount	4	221,755	92	217	19,942	11.12
Cullman	3	60,740	32	147	4,771	12.73
Jefferson	8	340,132	115	192	22,058	15.42
Marion	2	90,477	35	236	8,293	10.91
Tuscaloosa	8	661,533	215	175	37,587	17.60
Walker	13	1,226,420	277	209	57,795	21.22
Winston	1	112,537	28	219	6,150	18.30
Total Alabama	39	2,713,594	794	197	156,596	17.33
Alaska	6	542,211	152	236	35,837	15.13
Arkansas:						
Franklin	1	35,528	10	151	1,510	23.53
Johnson	4	124,449	31	123	9,906	12.56
Pope	1	66,708	20	304	6,075	10.98
Sebastian	2	31,684	30	192	5,761	5.50
Total Arkansas	8	258,369	141	165	23,254	11.11
Colorado:						
El Paso	1	4,392	3	145	435	10.10
Fremont	2	44,454	11	143	1,596	27.86
Jackson	(1)	(1)	(1)	(1)	(1)	(1)
Montrose	(1)	(1)	(1)	(1)	(1)	(1)
Routt	3	347,764	82	187	15,354	22.65
Other counties	2	155,218	27	105	2,847	54.52
Total Colorado	8	551,828	123	164	20,232	27.28
Illinois:						
Adams	1	37,087	16	179	2,864	12.95
Brown	1	1,482	4	96	383	3.87
Bureau	(1)	(1)	(1)	(1)	(1)	(1)
Fulton	12	5,087,610	774	255	197,424	25.77
Gallatin	(1)	(1)	(1)	(1)	(1)	(1)
Greene	1	7,433	2	315	630	11.80
Jackson	2	608,108	109	252	27,491	22.12
Jefferson	1	23,180	12	215	2,581	8.98
Kankakee	(1)	(1)	(1)	(1)	(1)	(1)
Knox	4	2,196,359	273	209	57,033	38.51
La Salle	1	6,756	15	73	1,093	6.18
Livingston	1	1,181	4	150	600	1.97
Mercer	(1)	(1)	(1)	(1)	(1)	(1)
Peoria	5	299,904	64	203	13,000	23.07
Perry	5	3,506,532	535	264	141,335	24.81
Randolph	2	186,954	18	289	5,164	36.20
St. Clair	(1)	(1)	(1)	(1)	(1)	(1)
Saline	6	1,398,460	324	219	70,952	19.71
Schuyler	(1)	(1)	(1)	(1)	(1)	(1)
Vermilion	5	1,153,522	152	256	38,918	29.64
Wabash	1	1,317	2	131	262	5.03
Will	(1)	(1)	(1)	(1)	(1)	(1)
Williamson	11	2,388,821	323	225	72,609	32.90
Other counties	12	5,007,291	733	218	159,534	31.39
Total Illinois	71	21,911,997	3,360	236	791,873	27.67
Indiana:						
Clay	10	896,566	180	250	45,076	19.89
Fountain	1	27,312	19	220	4,176	6.54
Greene	6	1,518,093	332	204	67,742	22.41
Knox	(1)	(1)	(1)	(1)	(1)	(1)
Martin	1	31,429	10	233	2,330	13.49
Owen	(1)	(1)	(1)	(1)	(1)	(1)
Parke	(1)	(1)	(1)	(1)	(1)	(1)
Pike	(1)	(1)	(1)	(1)	(1)	(1)
Spencer	2	75,277	26	182	4,681	16.08
Sullivan	2	84,567	41	155	6,349	13.32
Vermillion	1	23,028	45	35	1,589	14.49
Vigo	(1)	(1)	(1)	(1)	(1)	(1)
Warrick	8	4,468,336	370	262	96,990	46.07
Other counties	14	3,034,875	599	237	142,187	21.34
Total Indiana	45	10,159,483	1,622	229	371,120	27.38

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Iowa:						
Appanoose	1	18,119	4	96	384	47.18
Keokuk	1	1,930	4	90	360	5.36
Lucas	1	4,488	2	160	320	14.03
Mahaska	8	225,956	60	277	16,639	13.58
Marion	12	601,034	123	245	30,218	19.89
Monroe	3	35,469	10	210	2,100	16.89
Polk	1	1,519	2	35	70	21.70
Van Buren	1	17,094	8	156	1,248	13.70
Wapello	3	43,150	14	292	4,094	10.54
Warren	1	2,397	2	150	300	7.99
Total Iowa	32	951,156	229	243	55,733	17.07
Kansas:						
Bourbon	1	4,008	4	224	895	4.48
Cherokee	4	488,073	118	260	30,696	15.90
Coffey	1	2,230	2	154	308	7.24
Crawford	4	269,494	75	274	20,494	13.15
Osage	1	2,190	2	151	302	7.25
Total Kansas	11	765,995	201	262	52,695	14.54
Kentucky, Eastern:						
Bell	19	408,885	148	129	19,152	21.35
Boyd	1	30,186	40	60	2,384	12.66
Carter	1	5,700	6	95	570	10.00
Clay	12	176,689	71	185	13,078	13.51
Harlan	4	24,488	17	78	1,303	18.79
Knott	1	4,000	4	100	400	10.00
Knox	1	10,372	4	140	519	20.00
Laurel	5	243,598	126	131	16,448	14.81
Lee	1	2,600	4	10	36	72.50
Leslie	(1)	(1)	(1)	(1)	(1)	(1)
Letcher	3	220,231	51	226	11,524	19.11
McCreary	2	100,794	126	49	6,172	16.33
Magoffin	3	54,104	36	175	6,321	8.56
Morgan	5	91,703	57	96	5,501	16.67
Owsley	2	41,823	14	149	2,091	20.00
Perry	(1)	(1)	(1)	(1)	(1)	(1)
Pulaski	3	128,006	17	259	4,396	29.12
Rockcastle	3	53,816	23	162	3,803	14.15
Whitley	11	85,681	185	49	9,048	9.47
Wolfe	1	2,000	2	75	133	15.00
Other counties	3	15,515	20	22	432	35.91
Total Eastern Kentucky	81	1,700,191	951	109	103,311	16.46
Kentucky, Western:						
Butler	3	140,372	35	132	4,621	30.38
Caldwell	1	35,857	13	228	2,968	12.08
Christian	2	36,061	21	116	2,435	14.81
Daviess	2	763,239	65	294	19,138	39.88
Hancock	1	5,367	3	91	274	19.59
Hopkins	17	4,445,273	513	246	126,286	35.20
McLean	1	1,200	2	60	120	10.00
Muhlenberg	10	7,458,358	675	249	167,981	44.40
Ohio	11	3,162,774	284	263	74,664	42.36
Union	1	77,731	10	220	2,200	35.33
Webster	5	1,254,122	231	221	51,147	24.52
Total Western Kentucky	54	17,380,354	1,852	244	451,834	38.47
Total Kentucky	135	19,080,545	2,803	198	555,145	34.37
Maryland:						
Allegany	19	155,667	78	188	14,713	10.58
Garrett	18	392,417	120	198	23,768	16.51
Total Maryland	37	548,084	198	194	38,481	14.24

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Missouri:						
Barton	(1)	(1)	(1)	(1)	(1)	(1)
Bates	1	1,596	3	75	226	7.06
Callaway	(1)	(1)	(1)	(1)	(1)	(1)
Clark	1	10,902	9	192	1,728	6.31
Dade	1	17,000	9	285	2,564	6.63
Henry	(1)	(1)	(1)	(1)	(1)	(1)
Linn	(1)	(1)	(1)	(1)	(1)	(1)
Macon	(1)	(1)	(1)	(1)	(1)	(1)
Putnam	1	91,881	20	280	5,599	16.41
Ralls	1	4,000	6	100	600	6.67
Randolph	(1)	(1)	(1)	(1)	(1)	(1)
St. Clair	2	278,726	57	258	14,678	18.99
Schuyler	1	18,940	6	200	1,200	15.78
Vernon	4	87,957	30	187	5,610	15.68
Other counties	16	2,130,725	1,867	108	201,143	10.59
Total Missouri	28	2,641,727	2,007	116	233,348	11.32
Montana (bituminous):						
Carbon	(1)	(1)	(1)	(1)	(1)	(1)
Rosebud	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	3	8,998	14	201	2,808	3.20
Total Montana (bituminous)	3	8,998	14	201	2,808	3.20
Montana (lignite):						
Dawson	(1)	(1)	(1)	(1)	(1)	(1)
Richland	(1)	(1)	(1)	(1)	(1)	(1)
Sheridan	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	4	179,464	21	225	4,735	37.90
Total Montana (lignite)	4	179,464	21	225	4,735	37.90
Total Montana	7	188,462	35	216	7,543	24.99
New Mexico: McKinley	3	31,722	14	256	3,584	8.85
North Dakota (lignite):						
Adams	1	20,310	8	192	1,536	13.22
Bowman	1	157,609	12	231	2,777	56.76
Burke	2	399,297	46	232	10,676	37.40
Burleigh	1	14,382	3	204	612	23.50
Divide	1	207,370	35	244	8,556	24.24
Dunn	2	6,135	6	150	900	6.82
Grant	4	24,305	5	157	787	30.88
Hettinger	2	6,811	13	89	1,156	5.89
McLean	3	91,560	23	148	3,413	26.83
Mercer	4	925,057	100	214	21,438	43.15
Morton	4	24,066	10	184	1,840	13.08
Oliver	2	10,748	3	127	380	28.28
Stark	3	62,953	6	197	1,182	53.26
Ward	4	458,764	48	233	11,198	40.97
Total North Dakota (lignite)	34	2,409,367	318	209	66,451	36.26
Ohio:						
Athens	(1)	(1)	(1)	(1)	(1)	(1)
Belmont	26	2,080,169	523	163	85,183	24.42
Carroll	10	299,255	67	270	18,006	16.62
Columbiana	26	1,426,312	317	274	86,917	16.41
Coshocton	9	1,534,796	255	274	69,954	21.94
Gallia	7	666,683	126	255	32,021	20.82
Guernsey	7	218,805	94	142	13,285	16.47
Harrison	10	5,063,029	676	237	160,273	31.59
Hocking	5	33,576	27	110	2,945	11.40
Holmes	3	92,770	21	171	3,600	25.77
Jackson	12	223,439	58	228	13,143	17.00
Jefferson	25	2,243,666	429	258	110,798	20.25
Lawrence	4	291,099	50	243	12,149	23.96
Mahoning	17	904,553	175	285	49,948	18.11
Meigs	3	392,610	80	230	18,441	21.29
Morgan	4	2,364,384	250	253	63,151	37.44
Muskingum	6	311,400	58	214	12,347	25.22
Noble	9	1,393,431	166	220	36,420	38.26

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Ohio—Continued						
Perry	12	2,025,726	326	253	82,380	24.59
Portage	2	108,420	28	294	8,226	13.18
Stark	15	566,691	131	267	35,046	16.17
Tuscarawas	31	1,823,575	513	228	116,971	15.59
Vinton	6	201,647	93	263	24,442	8.25
Washington	(1)	(1)	(1)	(1)	(1)	(1)
Wayne	2	86,897	22	195	4,287	20.27
Other counties	7	300,047	81	208	16,815	17.84
Total Ohio	258	24,652,980	4,566	236	1,076,748	22.90
Oklahoma:						
Craig	4	124,036	41	241	9,868	12.57
Haskell	4	276,163	99	152	15,074	18.32
Le Flore	(1)	(1)	(1)	(1)	(1)	(1)
McIntosh	(1)	(1)	(1)	(1)	(1)	(1)
Nowata	1	5,669	4	50	200	28.35
Rogers	(1)	(1)	(1)	(1)	(1)	(1)
Sequoyah	1	161,631	29	276	8,013	20.17
Other counties	4	612,251	210	173	36,358	16.84
Total Oklahoma	14	1,179,750	383	181	69,513	16.97
Pennsylvania:						
Allegheny	27	562,506	158	191	30,145	18.66
Armstrong	36	1,312,151	291	336	97,776	13.42
Beaver	24	252,465	71	184	12,974	19.46
Bedford	4	61,351	21	188	4,026	15.24
Blair	(1)	(1)	(1)	(1)	(1)	(1)
Bradford	1	6,798	3	215	645	10.54
Butler	38	1,736,035	360	239	86,028	20.18
Cambria	27	481,595	244	160	39,027	12.34
Cameron	1	50,887	23	233	5,362	9.49
Centre	18	670,026	239	223	53,219	12.59
Clarion	31	2,832,050	588	269	158,304	17.89
Clearfield	106	4,846,473	1,472	233	342,992	14.13
Clinton	6	623,816	118	261	30,836	20.23
Elk	7	133,890	58	165	9,619	13.92
Fayette	31	335,352	128	134	17,092	19.62
Greene	3	7,243	6	37	222	32.63
Huntingdon	5	44,266	35	129	4,517	9.80
Indiana	33	1,031,364	336	204	68,575	15.04
Jefferson	29	660,661	257	173	44,489	14.85
Lawrence	28	995,981	198	246	48,799	20.41
Lycoming	2	42,870	15	201	2,944	14.56
McKean	3	42,293	17	164	2,793	15.14
Mercer	7	483,437	184	176	32,424	14.91
Somerset	54	1,100,925	312	178	55,490	19.84
Tioga	(1)	(1)	(1)	(1)	(1)	(1)
Venango	13	552,260	115	245	28,119	19.64
Washington	21	974,903	267	201	53,596	18.19
Westmoreland	23	160,016	58	112	6,460	24.77
Other counties	11	305,372	94	207	19,489	15.67
Total Pennsylvania	589	20,306,986	5,668	222	1,255,962	16.17
South Dakota (lignite): Dewey	1	22,125	9	252	2,269	9.75
Tennessee:						
Anderson	11	221,556	49	154	7,515	29.48
Campbell	16	262,097	143	109	15,601	16.80
Claiborne	3	18,914	46	65	3,012	6.28
Cumberland	2	50,144	33	113	3,734	13.43
Fentress	4	25,009	106	59	6,252	4.00
Grundy	(1)	(1)	(1)	(1)	(1)	(1)
Hamilton	2	9,871	24	20	489	20.19
Marion	4	185,380	135	65	8,765	21.15
Morgan	14	270,125	56	189	10,585	25.52
Scott	7	138,297	42	165	6,922	19.98
Sequatchie	(1)	(1)	(1)	(1)	(1)	(1)
Van Buren	2	15,408	8	100	823	18.73
Other counties	4	166,900	43	183	7,877	21.19
Total Tennessee	69	1,363,701	685	104	71,575	19.05

See footnote at end of table.

Digitized by Google

TABLE 30.—Stripping operations in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of strip mines	Production (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
Virginia:						
Buchanan	2	12,131	6	135	867	14.00
Dickenson	5	202,086	22	207	4,581	44.11
Lee	5	57,006	24	94	2,212	25.77
Russell	4	145,159	30	225	6,758	21.48
Tazewell	8	18,220	12	125	1,518	12.00
Wise	23	1,326,057	282	190	53,621	24.73
Total Virginia	42	1,760,659	376	185	69,557	25.31
Washington: Kittitas	2	23,443	11	165	1,817	12.90
West Virginia:						
Barbour	19	787,982	164	174	28,457	27.69
Boone	(1)	(1)	(1)	(1)	(1)	(1)
Braxton	1	34,655	6	81	486	71.31
Brooke	(1)	(1)	(1)	(1)	(1)	(1)
Fayette	3	86,813	42	111	4,677	18.56
Gilmer	(1)	(1)	(1)	(1)	(1)	(1)
Grant	1	24,019	14	134	1,905	12.61
Greenbrier	5	273,155	82	140	11,482	23.79
Harrison	26	1,451,503	300	227	68,210	21.28
Kanawha	5	180,081	42	181	7,592	23.72
Lewis	4	522,250	109	219	23,771	21.97
Logan	1	439,375	39	245	9,556	45.98
Marion	4	34,333	14	95	1,330	25.81
Mason	1	46,200	15	36	528	87.53
McDowell	9	346,516	118	162	19,187	18.06
Mercer	1	24,867	6	124	761	32.69
Mineral	(1)	(1)	(1)	(1)	(1)	(1)
Mingo	(1)	(1)	(1)	(1)	(1)	(1)
Monongalia	3	10,946	12	59	720	15.20
Nicholas	5	368,824	94	174	16,327	22.59
Ohio	1	19,256	21	197	4,132	4.66
Pocahontas	1	34,567	40	260	10,507	3.29
Preston	13	695,958	147	219	32,235	21.59
Raleigh	7	191,655	131	97	12,726	15.06
Randolph	4	168,268	31	219	6,804	24.73
Tucker	(1)	(1)	(1)	(1)	(1)	(1)
Upshur	7	110,722	35	172	5,946	18.62
Webster	2	15,533	18	236	4,244	3.66
Wyoming	8	547,651	160	158	25,307	21.64
Other counties	16	827,740	245	164	40,279	20.55
Total West Virginia	147	7,242,869	1,885	179	337,169	21.48
Wyoming:						
Campbell	1	426,909	30	263	7,875	54.17
Carbon	2	97,199	29	240	6,879	14.13
Converse	2	471,506	17	261	4,441	106.17
Lincoln	1	265,044	44	188	8,252	32.12
Sheridan	2	385,923	59	259	15,284	25.25
Total Wyoming	8	1,646,281	179	239	42,731	38.53
Total United States	1,594	120,953,334	25,759	207	5,339,233	22.65

[1] Included in "Other counties" to avoid disclosing individual operations.

AUGER MINING

Augers are generally used in areas where strip mining has become economically impracticable because of thick overburden. They were used first about 1945, and separate statistics on coal-recovery augers begin with 1952. The rapidly expanded production of coal by stripping during World War II in the mountainous areas of the northern Appalachian region left many miles of highwall containing exposed coal seams. After several years of experimentation, large,

Digitized by Google

efficient augers as much as 60 inches in diameter were developed to recover the coal from these exposed coal seams.

Production at auger mines increased rapidly from less than 2 million tons in 1952 to 8 million tons in 1959. Augers were used to mine coal in eight States in 1959, and sales of augers reported by four manufacturers indicate continued growth of auger mining. A few coal-recovery augers have been sold for underground use; these units and the coal produced by them have been included with coal loaded mechanically underground.

TABLE 31.—Auger mines in the bituminous coal and lignite fields of the United States, 1959, by States and counties

State and county	Number of auger mines	Equipment in use (number of units)				Mined by augers (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Augers	Power shovels	Power drills	Bull-dozers					
Alabama: Walker	3	3				60,897	10	290	2,300	26.48
Illinois:										
Gallatin	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Saline	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	2	2			2	27,202	7	87	609	44.67
Total Illinois	2	2			2	27,202	7	87	609	44.67
Kentucky, Eastern:										
Bell	11	11			6	275,131	100	129	12,899	21.33
Boyd	1	1				17,852	7	38	269	66.36
Clay	3	3			1	42,536	7	135	916	46.42
Harlan	12	11	2	2	11	217,879	76	83	*8,284	34.67
Knott	3	3				17,380	13	185	2,397	7.25
Leslie	5	5				213,326	57	114	6,468	32.98
Letcher	6	8		1	4	113,657	57	100	5,683	20.00
McCreary	1	1				2,659	2	100	177	15.00
Perry	11	11	3		6	505,806	77	212	16,313	31.01
Pike	25	27	3	3	19	626,770	134	153	20,443	30.66
Whitley	2	2	1		2	75,725	20	150	3,029	25.00
Total Eastern Kentucky	80	83	9	6	49	2,108,781	550	136	74,878	28.16
Kentucky, Western:										
Hopkins	1	1		1		12,000	3	60	180	66.67
Webster	1	1			1	17,718	3	87	261	67.89
Total Western Kentucky	2	2		1	1	29,718	6	74	441	67.39
Total Kentucky	82	85	9	7	50	2,138,499	556	135	75,319	28.39
Ohio:										
Athens	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Belmont	8	8			2	112,249	21	124	2,594	43.27
Carroll	4	4			1	41,601	11	113	1,248	33.33
Columbiana	9	9			5	83,158	28	157	4,405	18.88
Coshocton	2	2				8,798	6	58	363	24.26
Gallia	4	4			3	102,065	18	180	3,246	31.44
Harrison	5	6	1	2	6	60,304	23	109	2,500	24.12
Hocking	3	3	1		3	6,887	9	84	756	9.11
Jackson	1	1				1,256	2	34	68	18.47
Jefferson	6	5			1	131,876	14	175	2,527	52.19
Meigs	2	2			3	50,207	9	210	1,893	26.52
Muskingum	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Noble	2	2			1	47,624	4	197	801	59.45
Perry	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Tuscarawas	7	7			1	86,383	16	195	3,126	27.63
Washington	2	2			5	85,374	19	183	3,502	24.38
Other counties	4	5			3	114,497	23	160	3,673	31.17
Total Ohio	59	60	2	2	34	932,278	203	151	30,702	20.37

See footnote at end of table.

Digitized by Google

TABLE 31.—Auger mines in the bituminous coal and lignite fields of the United States, 1959, by States and counties—Continued

State and county	Number of auger mines	Equipment in use (number of units)				Mined by augers (net tons)	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day
		Augers	Power shovels	Power drills	Bull-dozers					
Pennsylvania:										
Armstrong	9	8		2	3	160,080	80	121	9,632	16.62
Butler	3	3		3		37,438	9	120	1,073	34.90
Cambria	1	1				14,957	15	57	857	17.45
Centre	1	1				4,263	1	160	171	25.00
Clarion	1	1		2		4,212	3	94	281	15.00
Clearfield	9	10		5		58,950	28	168	4,638	12.71
Elk	2	2			1	14,937	5	96	482	30.99
Indiana	3	3			1	44,243	10	102	996	44.41
Jefferson	4	4			1	15,401	13	75	944	16.31
Somerset	2	2				14,778	7	124	871	16.97
Washington	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Westmoreland	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other counties	3	3			1	28,678	27	44	1,199	23.92
Total Pennsylvania	38	38		12	7	397,937	198	107	21,144	18.82
Tennessee:										
Anderson	4	4				35,995	24	21	503	71.49
Campbell	2	2				73,844	8	173	1,394	52.96
Claiborne	2	1			1	11,879	25	54	1,326	8.96
Marion	2	2				94,609	28	65	1,789	52.87
Morgan	1	1			2	42,106	8	150	1,200	35.09
Scott	2	3		1	6	79,455	40	150	6,070	13.09
Total Tennessee	13	13		1	9	337,888	133	92	12,282	27.51
Virginia:										
Buchanan	4	4	1		2	67,468	15	141	2,117	31.87
Dickenson	1	1			1	30,000	3	207	621	32.21
Lee	2	2			2	19,544	12	94	1,102	17.73
Russell	6	6			7	241,342	67	221	14,797	16.31
Tazewell	8	8				120,482	53	57	2,993	40.25
Wise	12	14		4	4	239,058	42	143	5,984	39.95
Total Virginia	33	35	1	4	16	707,894	192	144	27,614	25.64
West Virginia:										
Barbour	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Boone	5	10	8	3	9	343,574	81	176	14,280	24.06
Brooke	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Clay	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Fayette	6	6	1		3	30,514	34	51	1,751	17.43
Gilmer	2	2			1	43,658	8	84	672	64.97
Greenbrier	1	1				6,116	4	90	360	16.99
Harrison	9	7			4	207,879	42	157	6,554	31.72
Kanawha	8	10	4		9	745,948	111	174	19,280	38.69
Lewis	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Logan	4	4	1	1	5	172,658	40	120	4,785	36.08
Mason	2	2			2	52,018	6	261	1,510	34.44
McDowell	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mercer	4	4	1		1	21,782	33	69	2,274	9.58
Mineral	1	1				1,305	4	15	60	21.75
Mingo	3	3	1	1	6	167,824	28	141	3,957	42.41
Monongalia	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Nicholas	4	5			3	123,045	41	147	6,020	20.44
Pocahontas	1	1			1	6,080	4	156	624	9.74
Preston	2	2			2	22,799	5	193	965	23.62
Raleigh	8	11		1	5	150,398	37	125	4,621	32.55
Randolph	2	2				10,262	12	51	606	16.93
Upshur	1	1			1	10,140	5	79	392	25.86
Webster	1	1			1	7,182	3	180	540	13.30
Wyoming	1	1			2	46,408	7	86	602	77.09
Other counties	15	21	4	2	23	868,328	178	145	25,738	33.74
Total West Virginia	80	95	20	8	78	3,037,918	683	140	95,591	31.78
Total United States	310	331	32	34	196	7,640,513	1,982	134	265,561	28.77

[1] Included in "Other counties" to avoid disclosing individual operations.

Digitized by Google

TABLE 32.—Units of coal-recovery augers sold to bituminous coal and lignite mines for surface use in the United States, as reported by manufacturers, 1955–59, by States

State	1955	1956	1957	1958	1959
Alabama				1	1
Colorado	1				
Illinois	1	2			1
Kentucky	11	15	16	13	21
Missouri			1		
Ohio	5	12	7	4	7
Pennsylvania	8	10	7	6	7
Tennessee		2	1	5	2
Virginia	6	7	5	4	1
West Virginia	33	41	16	9	7
Total	65	89	53	42	47

MECHANICAL LOADING

In the past 5 years the proportion of bituminous coal and lignite loaded mechanically at underground mines has increased from 84 to 86 percent of the total output. Although overall mechanization gained gradually during this period, the proportion produced by mobile loading into mine cars decreased from 17 to 5 percent of the total mechanically loaded, by mobile loading into shuttle cars from 63 to 61 percent, and by hand-loaded conveyors from 6 to 2 percent; production from continuous mining machines increased from 7 to 27 percent.

The most important change in mechanical loading in recent years was the introduction of continuous mining machines. In 1959, 66 million tons of bituminous coal was produced at 224 mines by continuous mining machines, compared with 56 million tons in 1958 from 213 mines. In 1959, 59 mines used continuous mining machines exclusively, compared with 45 in 1958.

Sales of all types of loading and mining equipment shipped to bituminous coal and lignite mines, as reported by manufacturers, increased in 1959.

Digitized by Google

TABLE 33.—Growth of mechanical loading at underground bituminous coal and lignite mines in the United States, 1923-59

(Production in thousand net tons)

Year	Underground production mechanically loaded									Underground production mechanically loaded (percent)	Number of mechanical loading units					
	Loaded by machines				Continuous mining machines	Handled by conveyors			Total mechanically loaded		Mobile loading machines	Scrapers	Conveyors equipped with duckbills or other self-loading heads	Continuous mining machines	Pit-car loaders	Hand-loaded conveyors
	Mobile loading machines	Scrapers	Conveyors equipped with duckbills or other self-loading heads	Total		Pit-car loaders	Hand-loaded conveyors	Total								
1923	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 1,880	[2] 0.3	(1)	(1)	(1)	----------	(1)	(1)
1924	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 3,496	[2] .7	(1)	(1)	(1)	----------	(1)	(1)
1925	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	[2] 6,243	[2] 1.2	(1)	(1)	(1)	----------	(1)	(1)
1926	7,786	1,554	682	10,022	----------	523	(1)	(1)	[2] 10,545	[2] 1.9	295	133	27	----------	(1)	(1)
1927	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	16,500	3.3	(1)	(1)	(1)	----------	(1)	(1)
1928	11,811	1,548	1,200	14,559	----------	4,117	2,883	7,000	21,559	4.5	397	130	82	----------	1,040	(1)
1929	16,432	1,550	1,309	19,291	----------	14,979	3,592	18,571	37,862	7.4	488	126	99	----------	2,521	(1)
1930	20,073	1,637	1,628	23,338	----------	19,116	4,528	23,644	46,982	10.5	545	150	140	----------	2,876	(1)
1931	19,407	1,471	1,811	22,689	----------	19,172	5,701	24,873	47,562	13.1	583	146	165	----------	3,428	(1)
1932	14,825	1,132	1,630	17,587	----------	12,590	5,640	18,230	35,817	12.3	548	128	159	----------	3,112	(1)
1933	17,865	991	1,656	20,512	----------	11,413	5,896	17,309	37,821	12.0	523	93	132	----------	2,453	525
1934	20,750	1,004	2,082	23,836	----------	11,089	6,508	17,597	41,433	12.2	534	119	157	----------	2,288	574
1935	24,675	1,118	2,595	28,388	----------	11,098	7,691	18,789	47,177	13.5	657	78	179	----------	2,098	670
1936	40,970	1,273	3,240	45,483	----------	10,538	10,956	21,494	66,977	16.3	980	106	234	----------	1,851	936
1937	(1)	(1)	(1)	(1)	----------	(1)	(1)	(1)	83,500	20.2	(1)	(1)	(1)	----------	(1)	(1)
1938	57,824	1,031	4,248	63,103	----------	5,653	16,337	21,990	85,093	26.7	1,405	117	346	----------	1,392	1,526
1939	76,442	1,007	6,759	84,208	----------	5,038	21,466	26,504	110,712	31.0	1,573	131	559	----------	873	1,834
1940	100,962	1,255	10,362	112,579	----------	3,979	31,312	35,291	147,870	35.4	1,720	116	656	----------	697	2,263
1941	126,478	1,290	14,918	142,686	----------	3,447	40,534	43,981	186,667	40.7	1,985	109	788	----------	607	2,807
1942	160,301	1,405	20,683	182,389	----------	3,252	47,262	50,514	232,903	45.2	2,301	93	1,062	----------	481	3,041
1943	179,008	1,349	22,917	203,274	----------	2,669	43,862	46,531	249,805	48.9	2,525	83	1,226	----------	321	3,191
1944	202,875	1,341	23,164	227,380	----------	1,835	44,974	46,809	274,189	52.9	2,737	87	1,331	----------	241	3,236

Digitized by Google

1945	198,668	1,252	21,506	221,426	----------	986	40,100	41,086	262,512	56.1	2,950	87	1,383	----------	142	3,385
1946	186,975	917	19,678	207,570	----------	623	37,148	37,771	245,341	58.3	3,200	75	1,521	----------	93	3,470
1947	229,836	854	21,921	252,611	----------	353	45,193	45,546	298,157	60.7	3,569	67	1,531	----------	71	3,979
1948	[1]232,667	743	19,634	253,044	(2)	184	42,578	42,762	295,806	64.3	[3]3,980	56	1,632	(2)	37	4,125
1949	[3]177,239	339	13,994	191,572	(2)	54	30,750	30,804	222,376	67.0	[3]4,205	46	1,483	(2)	17	4,312
1950	[1]222,976	318	13,985	237,279	(2)	39	35,407	35,446	272,725	69.4	[4]4,318	39	1,329	(2)	12	4,434
1951	[1]252,663	126	13,884	266,673	(2)	(5)	37,583	37,583	304,256	73.1	[4]4,410	22	1,242	(2)	(5)	3,904
1952	218,982	77	10,590	229,649	8,215	(5)	31,130	31,130	268,994	75.5	4,083	19	1,049	152	(5)	3,569
1953	232,585	239	8,531	241,355	11,830	(5)	25,144	25,144	278,329	79.6	3,985	29	849	219	(5)	2,994
1954	206,546	411	4,672	211,629	16,336	(5)	15,005	15,005	242,970	84.0	4,314	48	633	325	(5)	2,162
1955	243,204	141	4,369	247,714	27,460	(5)	15,497	15,497	290,671	84.6	3,819	23	487	385	(5)	1,925
1956	248,341	156	3,727	252,224	39,907	(5)	15,271	15,271	307,402	84.0	3,854	35	437	510	(5)	1,819
1957	236,720	82	2,699	239,501	53,783	(5)	12,453	12,453	305,737	84.8	3,755	14	361	614	(5)	1,528
1958	178,014	10	1,550	179,574	56,373	(5)	7,626	7,626	243,573	84.9	3,434	7	242	679	(5)	1,230
1959	171,150	(7)	[8]1,010	172,160	65,792	(5)	5,779	5,779	243,731	86.0	3,121	(7)	[8]144	776	(5)	1,014

[1] Data not available.
[2] Exclusive of tonnage "Handled by conveyors."
[3] Includes continuous mining machines.
[4] Included with mobile loading machines.
[5] Includes continuous mining machines and augers.
[6] Canvass of pit-car loaders discontinued in 1951.
[7] Included with conveyors equipped with duckbills or other self-loading beads.
[8] Includes scrapers.

Digitized by Google

TABLE 34.—Bituminous coal and lignite mechanically loaded underground in the United States, 1958–59, by type of loading equipment

Type of equipment	1958		1959	
	Net tons	Percentage of total	Net tons	Percentage of total
Mobile loading machines:				
Loading direct into mine cars	13,657,990	5.6	11,282,975	4.6
Loading onto conveyors	13,563,199	5.6	11,626,461	4.8
Loading into shuttle cars	150,792,401	61.9	148,240,818	60.8
Continuous mining machines:				
Loading onto conveyors	56,373,297	23.2	8,614,832	3.5
Loading into shuttle cars			57,177,244	23.5
Scrapers and conveyors equipped with duckbills or other self-loading heads	1,560,552	.6	1,009,601	.4
Hand-loaded conveyors	7,625,648	3.1	5,779,253	2.4
Total mechanically loaded	243,573,087	100.0	243,731,184	100.0

Digitized by Google

69112—60——7

TABLE 35.—Comparative changes in underground mechanical loading of bituminous coal and lignite by principal types of loading devices in the United States, 1958–59, by States

State	Net tons by—						Total mechanically loaded (net tons)		Total production at mines using mechanical loading devices (net tons)		Handled by each class (percent)					
	Loading machines [1]		Continuous mining machines		Hand-loaded conveyors						Loading machines [1]		Continuous mining machines		Hand-loaded conveyors	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	6,536,231	6,943,507	1,252,708	1,287,414	357,992	388,178	8,146,931	8,619,099	8,146,931	8,623,060	80.2	80.6	15.4	14.9	4.4	4.5
Alaska	7,703						7,703		158,081		100.0					
Arkansas	3,000	20,742	5,206	28,618	69,732	125,235	77,938	174,595	77,938	174,595	3.8	11.9	6.7	16.4	89.5	71.7
Colorado	1,466,685	1,351,942	471,733	853,975	256,409	209,432	2,194,827	2,415,349	2,445,402	2,653,858	66.8	56.0	21.5	35.3	11.7	8.7
Illinois	17,432,826	17,368,976	5,721,470	5,980,466			23,154,296	23,349,442	23,169,667	23,359,858	75.3	74.4	24.7	25.6		
Indiana	4,272,885	4,109,682	325,938	427,012			4,598,823	4,536,694	4,598,823	4,536,694	92.9	90.6	7.1	9.4		
Iowa	100,068	97,372					100,068	97,372	100,068	97,372	100.0	100.0				
Kentucky	29,612,417	27,847,801	3,207,241	2,990,829	306,280	260,744	33,125,938	31,099,374	33,536,427	31,298,807	89.4	89.6	9.7	9.6	.9	.8
Maryland					139,017	126,173	139,017	126,173	143,880	134,667					100.0	100.0
Montana (bituminous)	171,935	125,029			4,361	5,068	176,296	130,097	176,296	130,097	97.5	96.1			2.5	3.9
New Mexico	16,702	22,799		44,354	600	400	17,302	67,553	30,171	76,570	96.5	33.7		65.7	3.5	.6
Ohio	5,180,226	5,680,952	2,950,114	2,813,759	86,176	95,703	8,216,516	8,590,414	8,253,516	8,600,859	63.0	66.1	35.9	32.8	1.1	1.1
Oklahoma	52,877	31,642			296,484	308,330	349,361	339,972	349,361	339,972	15.1	9.3			84.9	90.7
Pennsylvania	20,613,282	17,684,236	21,780,874	22,661,111	1,884,856	1,397,631	44,279,012	41,742,978	44,460,653	41,875,012	46.5	42.4	49.2	54.3	4.3	3.3
Tennessee	1,828,149	1,708,776		36,000	112,467	120,801	1,940,616	1,865,577	1,956,785	1,877,330	94.2	91.6		1.9	5.8	6.5
Utah	4,248,082	3,364,653	1,059,268	1,169,479	7,555		5,314,905	4,534,132	5,314,905	4,534,132	79.9	74.2	19.9	25.8	.2	
Virginia	11,726,203	13,249,416	944,964	1,283,137	170,446	169,123	12,841,613	14,701,676	13,154,516	14,999,810	91.3	90.1	7.4	8.7	1.3	1.2
Washington	37,740	79,156	97,712	93,530	94,850	23,792	230,302	196,478	230,302	196,478	16.4	40.3	42.4	47.6	41.2	12.1
West Virginia	75,974,040	72,220,925	18,519,029	26,081,064	3,806,053	2,515,453	98,299,122	100,817,442	99,167,324	101,300,772	77.3	71.6	18.8	25.9	3.9	2.5
Wyoming	293,091	252,249	37,040	41,328	32,370	33,190	362,501	326,767	362,501	328,625	80.9	77.2	10.2	12.6	8.9	10.2
Total	179,574,142	172,159,855	56,373,297	65,792,076	7,625,648	5,779,253	243,573,087	243,731,184	245,833,547	245,138,568	73.7	70.6	23.2	27.0	3.1	2.4

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.

Digitized by Google

TABLE 36.—Number of underground bituminous coal and lignite mines using mechanical loading devices and number of units in use in the United States, 1958–59, by States

State	Number of mines										Number of loading devices							
	Using loading machines only [1]		Using continuous mining machines only		Using hand-loaded conveyors only		Using more than one type of mechanical loading		Total		Loading machines				Continuous mining machines		Hand-loaded conveyors (number of units)	
											Mobile		Scrapers and duckbills or other self-loading conveyors					
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	14	15			13	15	5	5	32	35	111	109	1		18	20	79	72
Alaska	2								2		2							
Arkansas					11	7	1	1	12	8	2	2			1	1	24	16
Colorado	38	35	1	2	16	16	6	7	61	60	57	55	104	34	10	13	42	45
Illinois	44	40	1	1			6	6	51	47	144	131	10	11	38	39		
Indiana	18	17					2	2	20	19	71	82			4	4		
Iowa	3	2							3	2	5	4						
Kentucky	121	98	7	8	21	20	12	11	161	137	501	416			38	47	50	49
Maryland					7	9			7	9							18	21
Montana (bituminous)	8	7			1	1			9	8	10	7	8	5			2	2
New Mexico	1				1	1		1	2	2	2	2				3	1	1
Ohio	21	18	4	4	15	11	4	6	44	39	104	98			34	35	27	33
Oklahoma					4	5	1	1	5	6	5	6					78	79
Pennsylvania	64	68	13	17	109	108	60	52	246	245	661	577	72	56	303	306	347	295
Tennessee	12	10		1	6	4		1	18	16	28	28	16	12		1	15	14
Utah	32	37	1				7	6	40	43	138	132	3	3	19	22	1	
Virginia	56	57		1	4	3	11	7	71	68	186	177	2		18	17	20	9
Washington		1	1	1	1	1	3	3	5	6	5	4			6	6	26	14
West Virginia	212	193	16	23	63	53	77	75	368	344	1,385	1,277	16	6	189	260	478	342
Wyoming	7	7	1	1			1	1	9	9	17	14	17	17	1	2	22	22
Total	653	603	45	59	272	254	196	185	1,166	1,103	3,434	3,121	249	144	679	776	1,230	1,014

[1] Includes mobile loading machines, scrapers, and conveyors equipped with duckbills or other self-loading heads.

Digitized by Google

TABLE 37.—Underground production at bituminous coal and lignite mines in the United States, 1958–59, by States and methods of loading

State	Hand loaded (net tons)		Mechanically loaded (net tons)		Total underground production (net tons)		Underground output hand loaded (percent)		Underground output mechanically loaded (percent)	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	357,847	553,550	8,146,931	8,619,099	8,504,778	9,172,649	4.2	6.0	95.8	94.0
Alaska	193,743	117,689	7,703		201,446	117,689	96.2	100.0	3.8	
Arizona	7,649	7,284			7,649	7,284	100.0	100.0		
Arkansas	6,855	8,344	77,938	174,595	84,793	182,939	8.1	4.6	91.9	95.4
Colorado	356,587	326,965	2,194,827	2,415,349	2,551,414	2,742,314	14.0	11.9	86.0	88.1
Georgia	8,751	6,767			8,751	6,767	100.0	100.0		
Illinois	219,051	176,975	23,154,296	23,349,442	23,373,347	23,526,417	.9	.8	99.1	99.2
Indiana	104,011	107,324	4,598,823	4,536,694	4,702,834	4,644,018	2.2	2.3	97.8	97.7
Iowa	150,888	131,372	100,068	97,372	250,956	228,744	60.1	57.4	39.9	42.6
Kansas	9,118	6,059			9,118	6,059	100.0	100.0		
Kentucky	12,995,736	10,491,431	33,125,938	31,099,374	46,121,674	41,590,805	28.2	25.2	71.8	74.8
Maryland	206,410	168,170	139,017	126,173	345,427	294,343	59.8	57.1	40.2	42.9
Missouri	113,147	105,956			113,147	105,956	100.0	100.0		
Montana:										
Bituminous	8,816	13,269	176,296	130,097	185,112	143,366	4.8	9.3	95.2	90.7
Lignite	15,622	13,327			15,622	13,327	100.0	100.0		
Total Montana	24,438	26,596	176,296	130,097	200,734	156,693	12.2	17.0	87.8	83.0
New Mexico	81,749	49,275	17,302	67,553	99,051	116,828	82.5	42.2	17.5	57.8
North Dakota (lignite)	3,049	3,251			3,049	3,251	100.0	100.0		
Ohio	982,096	936,308	8,216,516	8,590,414	9,198,612	9,526,722	10.7	9.8	89.3	90.2
Oklahoma	19,165	5,317	349,361	339,972	368,526	345,289	5.2	1.5	94.8	98.5
Pennsylvania	3,510,836	2,899,187	44,279,012	41,742,978	47,789,848	44,642,165	7.3	6.5	92.7	93.5
Tennessee	2,411,782	2,345,558	1,940,616	1,865,577	4,352,398	4,211,135	55.4	55.7	44.6	44.3
Utah	12,611	10,425	5,314,905	4,534,132	5,327,516	4,544,557	.2	.2	99.8	99.8
Virginia	11,583,863	12,598,611	12,841,613	14,701,676	24,425,476	27,300,287	47.4	46.1	52.6	53.9
Washington	17,087	22,397	230,302	196,478	247,389	218,875	6.9	10.2	93.1	89.8
West Virginia	9,933,211	8,593,900	98,299,122	100,817,442	108,232,333	109,411,342	9.2	7.9	90.8	92.1
Wyoming	1,477	3,760	362,501	326,767	363,978	330,527	.4	1.1	99.6	98.9
Total	43,311,157	39,702,471	243,573,087	243,731,184	286,884,244	283,433,655	15.1	14.0	84.9	86.0

Digitized by Google

TABLE 38.—Units of mechanical loading equipment sold to bituminous coal and lignite mines for underground use in the United States, as reported by manufacturers, 1955–59

Type of equipment	1955	1956	1957	1958	1959	Change from 1958 (percent)
Mobile loading machines	120	239	209	97	95	−2.1
Continuous mining machines	109	154	168	107	140	+30.8
Scrapers				1		
Conveyors [1]	143	232	159	92	65	−29.3
Total	372	625	536	297	300	+1.0
Number of manufacturers reporting	22	22	21	18	17	−5.6

[1] Includes hand-loaded conveyors and those equipped with duckbills or other self-loading heads.

TABLE 39.—Units of mechanical loading equipment sold for use in bituminous coal and lignite mines in the United States, as reported by manufacturers, 1958–59, by States

State	Mobile loading machines		Continuous mining machines		Room conveyors [1]	
	1958	1959	1958	1959	1958	1959
Alabama	12	5	3	3	4	6
Arkansas				1		
Colorado	1		3	2	1	
Illinois			3	1		
Indiana	3	3	1	2		
Kentucky	16	5	11	3	6	2
New Mexico		3		6		
Ohio	1	5	3	4	1	3
Pennsylvania	8	6	24	60	14	10
Tennessee	1					1
Utah			1	3		
Virginia	10	14	1		4	3
West Virginia	45	54	57	55	62	40
Total	97	95	107	140	92	65

[1] Includes hand-loaded conveyors and those equipped with duckbulls or other self-loading heads.

TABLE 40.—Units of conveying equipment sold for use in bituminous coal and lignite mines in the United States, as reported by manufacturers, 1958–59, by States

State	Bridge conveyors		Shuttle cars		Gathering and haulage conveyors [1]	
	1958	1959	1958	1959	1958	1959
Alabama	6	6	7	24	1	10
Alaska						5
Arkansas		1				
Colorado			3	5		1
Illinois			4	3	5	1
Indiana			8		8	2
Kentucky	3	1	39	10	7	6
New Mexico			2	6		1
Ohio	1	1	2	8		
Oklahoma						2
Pennsylvania	11	10	18	43	14	16
Tennessee		2				2
Utah			7		1	2
Virginia	1		24	25	18	11
West Virginia	44	40	67	109	43	59
Total	66	61	181	233	97	118

[1] Includes all gathering and haulage conveyors with a capacity over 500 feet, except main-slope conveyors

Digitized by Google

MECHANICAL CLEANING

Mechanical cleaning means cleaning raw coal with mechanical devices that separate out impurities, usually by differences in specific gravity, and does not include coal that is only screened. Mechanical devices are divided into two general classes—wet and pneumatic. About 93 percent of the coal cleaned in 1959 was cleaned by wet methods. Approximately half of all bituminous coal cleaned in the United States is cleaned with jigs. The various types of mechanical cleaning equipment are described in detail in Minerals Yearbook, 1953, Volume II, Fuels, pages 94–96.

Mechanical cleaning of bituminous coal increased more rapidly at underground mines than at strip mines from 1955 to 1959; the proportion of the output cleaned at underground mines increased about 9 percent during this period, whereas at strip mines the increase was only 6 percent. Increased mechanical loading at underground mines was the principal reason for the increased proportion of underground coal that required cleaning.

In the following tables on mechanical cleaning, where data are tabulated by States, the tonnage is credited to the State from which the coal was mined. The cleaning plant has been credited to the State where most of the coal was mined.

TABLE 41.—Growth of mechanical cleaning at bituminous coal and lignite mines in the United States, 1927–59

Year	Total production (thousand tons)	Mechanical cleanin					Percentage of total production mechanically cleaned
		Number of cleaning plants	Raw coal (thousand tons)	Cleaned coal (thousand tons)	Refuse (thousand tons)	Percentage of refuse to raw coal	
1927	517,763	(1)	(1)	27,692	(1)	(1)	5.3
1928	500,745	236	(1)	28,783	(1)	(1)	5.7
1929	534,989	280	40,241	36,799	3,442	8.6	6.9
1930	467,526	297	42,645	38,800	3,845	9.0	8.3
1931	382,089	312	39,529	36,172	3,357	8.5	9.5
1932	309,710	309	32,903	30,278	2,625	8.0	9.8
1933	333,630	290	37,682	34,558	3,124	8.3	10.4
1934	359,368	293	43,556	39,827	3,729	8.6	11.1
1935	372,373	320	49,473	45,361	4,112	8.3	12.2
1936	439,088	342	67,162	61,095	6,067	9.0	13.9
1937	445,531	(1)	(1)	65,000	(1)	(1)	14.6
1938	348,545	374	71,207	63,455	7,752	10.9	18.2
1939	394,855	366	88,895	79,429	9,466	10.6	20.1
1940	460,771	387	115,692	102,270	13,422	11.6	22.2
1941	514,149	417	133,379	117,540	15,839	11.9	22.9
1942	582,693	438	162,598	142,187	20,411	12.6	24.4
1943	590,177	432	167,310	145,576	21,734	13.0	24.7
1944	619,576	439	182,071	158,727	23,344	12.8	25.6
1945	577,617	439	172,899	147,886	25,013	14.5	25.6
1946	533,922	445	163,633	138,670	24,963	15.3	26.0
1947	630,624	461	206,620	174,436	32,184	15.6	27.7
1948	599,518	502	215,217	180,880	34,337	16.0	30.2
1949	437,868	571	184,691	153,652	31,039	16.8	35.1
1950	516,311	612	238,391	198,699	39,692	16.7	38.5
1951	533,665	631	289,838	240,010	49,828	17.2	45.0
1952	466,841	625	274,246	227,265	46,981	17.1	48.7
1953	457,290	611	295,654	241,759	53,895	18.2	52.9
1954	391,706	613	287,004	232,764	54,240	18.9	59.4
1955	464,633	575	335,458	272,715	62,743	18.7	58.7
1956	500,874	583	359,378	292,365	67,013	18.6	58.4
1957	492,704	593	376,546	304,027	72,519	19.3	61.7
1958	410,446	573	320,898	259,035	61,863	19.3	63.1
1959	412,028	555	337,138	269,787	67,351	20.0	65.5

[1] Data not available.

Digitized by Google

TABLE 42.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1959, by States

State	Total production (net tons)	Mechanical cleaning					Percentage of total production mechanically cleaned
		Number of cleaning plants	Raw coal (net tons)	Cleaned coal (net tons)	Refuse (net tons)	Percentage of refuse to raw coal	
Alabama	11,947,140	34	16,848,518	10,804,883	6,043,635	35.9	90.4
Alaska	659,900	3	413,390	251,319	162,071	39.2	38.1
Arkansas	441,308	(1)	(1)	(1)	(1)	(1)	(1)
Colorado	3,294,142	[2] 3	[2] 1,241,404	[2] 1,010,687	[2] 230,717	[2] 18.6	[2] 30.7
Illinois	45,465,616	58	51,556,443	43,410,877	8,145,566	15.8	95.5
Indiana	14,803,501	20	12,755,549	10,390,104	2,365,445	18.5	70.2
Kansas	772,054	4	1,039,420	705,699	333,721	32.1	91.4
Kentucky	62,809,849	81	51,138,741	42,070,715	9,068,026	17.7	67.0
Missouri	2,747,683	8	2,600,195	1,922,854	677,341	26.0	70.0
Montana (bituminous)	152,364	1	11,021	9,833	1,188	10.8	6.5
New Mexico	148,550	1	95,932	67,153	28,779	30.0	45.2
Ohio	35,111,980	23	19,107,793	15,897,365	3,210,428	16.8	45.3
Oklahoma	1,525,039	3	535,813	456,526	79,287	14.8	29.9
Pennsylvania	65,347,088	89	49,125,038	38,921,850	10,203,188	20.8	59.6
Tennessee	5,912,724	1	35,839	32,086	3,753	10.5	.5
Utah	4,544,557	6	3,664,462	2,998,015	666,447	18.2	66.0
Virginia	29,768,840	29	18,538,176	14,030,556	4,507,620	24.3	47.1
Washington	242,318	5	393,024	230,571	162,453	41.3	95.2
West Virginia	119,692,129	184	107,983,616	86,523,323	21,460,293	19.9	72.3
Wyoming	1,976,808	2	53,769	52,271	1,498	2.8	2.6
Other States [3]	4,663,912						
Total	412,027,502	555	337,138,143	269,786,687	67,351,456	20.0	65.5

[1] Included in Colorado.
[2] Includes Arkansas.
[3] Includes Arizona, Georgia, Iowa, and Maryland and lignite from Montana, North Dakota, and South Dakota.

TABLE 43.—Mechanical cleaning of bituminous coal and lignite in the United States, 1927–59, by types of equipment

Year	Wet methods								Pneumatic methods	Grand total
	Jigs	Concentrating tables	Classifiers	Launders	Dense-medium processes	Jigs and tables	Other combinations	Total		
	CLEAN COAL (THOUSAND NET TONS)									
1927	18,741	3,200	(1)	[2] 1,000	(1)	300	800	24,041	3,651	27,692
1928	17,927	3,412	(1)	[2] 2,446	(1)	1,056	156	24,997	3,786	28,783
1929	18,915	3,532	(1)	[2] 7,103	(1)	1,214	191	30,955	5,844	36,799
1930	17,724	2,272	(1)	[2] 9,818	(1)	1,029	62	30,905	7,895	38,800
1931	13,957	1,551	(1)	[2] 11,213	(1)	926	11	27,658	8,514	36,172
1932	9,963	821	(1)	[2] 12,140	(1)	806	9	23,739	6,539	30,278
1933	11,895	1,119	(1)	[2] 13,272	(1)	693	5	26,984	7,574	34,558
1934	14,012	1,116	(1)	[2] 15,168	(1)	1,227	6	31,529	8,298	39,827
1935	15,735	1,118	(1)	[2] 18,454	(1)	1,549	---	36,856	8,505	45,361
1936	23,417	1,843	(1)	[2] 22,631	(1)	2,613	---	50,504	10,591	61,095
1937	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	65,000
1938	27,615	984	4,521	10,681	4,450	2,791	2,145	53,187	10,268	63,455
1939	37,056	1,402	5,917	12,809	4,683	3,256	2,611	67,734	11,695	79,429
1940	47,064	2,330	7,762	16,269	6,692	2,765	4,408	87,290	14,980	102,270
1941	53,287	2,510	8,177	16,954	9,344	4,364	5,742	100,378	17,162	117,540
1942	66,876	3,138	10,529	18,658	12,495	4,366	5,938	122,000	20,187	142,187
1943	66,092	2,929	11,854	17,424	13,388	4,322	8,366	124,375	21,201	145,576
1944	74,175	2,753	14,780	19,686	13,869	4,649	8,751	138,663	20,064	158,727

See footnotes at end of table.

Digitized by Google

TABLE 43.—Mechanical cleaning of bituminous coal and lignite in the United States, 1927–59, by types of equipment—Continued

Year	Wet methods								Pneumatic methods	Grand total
	Jigs	Concentrating tables	Classifiers	Launders	Dense-medium processes	Jigs and tables	Other combinations	Total		
	CLEAN COAL (THOUSAND NET TONS)									
1945	68,609	2,594	14,203	18,980	12,875	4,754	8,455	130,470	17,416	147,886
1946	64,702	1,447	13,883	16,021	14,173	3,776	8,057	122,059	16,611	138,670
1947	85,931	2,980	14,648	17,902	17,702	4,303	12,617	156,083	18,353	174,436
1948	87,506	4,360	18,304	16,788	20,638	5,252	11,816	164,664	16,216	180,880
1949	72,423	4,040	14,865	11,238	17,821	3,288	17,033	140,708	12,944	153,652
1950	94,161	4,693	18,059	11,630	28,948	6,153	19,526	183,170	15,529	198,699
1951	101,746	5,811	23,174	10,362	33,840	7,613	38,884	221,430	18,580	240,010
1952	97,336	3,723	19,296	11,738	31,321	8,280	36,925	208,619	18,646	227,265
1953	101,001	4,002	18,312	11,988	36,805	8,647	41,739	222,494	19,265	241,759
1954	99,913	6,606	16,115	12,156	43,104	9,024	27,119	214,037	18,727	232,764
1955	114,538	7,443	17,656	11,400	49,332	13,953	38,098	252,420	20,295	272,715
1956	124,858	9,535	15,064	10,223	56,937	10,978	40,459	268,054	24,311	292,365
1957	133,844	14,389	14,282	8,306	63,678	11,557	33,203	279,259	24,768	304,027
1958	115,321	18,142	8,793	6,768	52,735	10,076	28,318	240,153	18,882	259,035
1959	126,836	27,453	8,935	7,305	66,951	10,801	3,257	251,538	18,249	269,787
	PERCENTAGE CLEANED BY EACH TYPE									
1927	67.6	11.6	(1)	[2] 3.6	(1)	1.1	2.9	86.8	13.2	100.0
1928	62.3	11.8	(1)	[2] 8.5	(1)	3.7	.5	86.8	13.2	100.0
1929	51.4	9.6	(1)	[2] 19.3	(1)	3.3	.5	84.1	15.9	100.0
1930	45.6	5.9	(1)	[2] 25.3	(1)	2.7	.2	79.7	20.3	100.0
1931	38.6	4.3	(1)	[2] 31.0	(1)	2.6	----------	76.5	23.5	100.0
1932	32.8	2.7	(1)	[2] 40.2	(1)	2.7	----------	78.4	21.6	100.0
1933	34.4	3.2	(1)	[2] 38.5	(1)	2.0	----------	78.1	21.9	100.0
1934	35.2	2.8	(1)	[2] 38.1	(1)	3.1	----------	79.2	20.8	100.0
1935	34.7	2.5	(1)	[2] 40.7	(1)	3.4	----------	81.3	18.7	100.0
1936	38.3	3.0	(1)	[2] 37.1	(1)	4.3	----------	82.7	17.3	100.0
1937	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	100.0
1938	43.5	1.6	7.1	16.8	7.0	4.4	3.4	83.8	16.2	100.0
1939	46.6	1.8	7.5	16.1	5.9	4.1	3.3	85.3	14.7	100.0
1940	46.0	2.3	7.6	15.9	6.5	2.7	4.3	85.3	14.7	100.0
1941	45.3	2.2	7.0	14.4	7.9	3.7	4.9	85.4	14.6	100.0
1942	47.0	2.2	7.4	13.1	8.8	3.1	4.2	85.8	14.2	100.0
1943	45.4	2.0	8.1	12.0	9.2	3.0	5.7	85.4	14.6	100.0
1944	46.7	1.8	9.3	12.4	8.8	2.9	5.5	87.4	12.6	100.0
1945	46.4	1.8	9.6	12.8	8.7	3.2	5.7	88.2	11.8	100.0
1946	46.7	1.0	10.0	11.6	10.2	2.7	5.8	88.0	12.0	100.0
1947	49.3	1.7	8.4	10.3	10.1	2.5	7.2	89.5	10.5	100.0
1948	48.4	2.4	10.1	9.3	11.4	2.9	6.5	91.0	9.0	100.0
1949	47.1	2.6	9.7	7.3	11.6	2.2	11.1	91.6	8.4	100.0
1950	47.4	2.4	9.1	5.8	14.6	3.1	9.8	92.2	7.8	100.0
1951	42.4	2.4	9.7	4.3	14.1	3.2	16.2	92.3	7.7	100.0
1952	42.8	1.6	8.5	5.2	13.8	3.6	16.3	91.8	8.2	100.0
1953	41.8	1.6	7.6	4.9	15.2	3.6	17.3	92.0	8.0	100.0
1954	42.8	3.0	5.7	3.9	21.8	3.5	14.4	95.1	4.9	100.0
1955	42.0	2.7	6.5	4.2	18.1	5.1	14.0	92.6	7.4	100.0
1956	42.7	3.3	5.1	3.5	19.5	3.8	13.8	91.7	8.3	100.0
1957	44.0	4.8	4.7	2.7	21.0	3.8	10.9	91.9	8.1	100.0
1958	44.5	7.0	3.4	2.6	20.4	3.9	10.9	92.7	7.3	100.0
1959	47.0	10.2	3.3	2.7	24.8	4.0	1.2	93.2	6.8	100.0

[1] Included in launders.
[2] Includes classifiers and dense-media processes.
[3] Data not available.

Digitized by Google

TABLE 44.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1955–59, by underground, strip, and auger mining

Type of mine	1955	1956	1957	1958	1959
Underground:					
Total production.....net tons..	343,465,239	365,774,043	360,649,141	286,884,244	283,433,655
Cleaned.....do....	217,199,126	232,231,914	242,961,446	196,710,828	203,829,017
Cleaned.....percent..	63.2	63.5	67.4	69.3	71.9
Strip:					
Total production.....net tons..	115,092,769	127,055,382	124,108,538	116,241,787	120,953,334
Cleaned.....do....	54,423,341	58,271,513	59,317,324	58,932,257	64,417,972
Cleaned.....percent..	47.3	45.9	47.8	50.7	53.3
Auger:					
Total production.....net tons..	6,075,400	8,044,652	7,946,237	7,319,516	7,640,513
Cleaned.....do....	1,093,017	1,561,957	1,728,424	1,391,766	1,539,698
Cleaned.....percent..	18.0	23.1	21.8	19.0	20.2
Grand total:					
Total production.....net tons..	464,633,408	500,874,077	492,703,916	410,445,547	412,027,502
Cleaned.....do....	272,715,484	292,365,384	304,027,194	259,034,851	269,786,687
Cleaned.....percent..	58.7	58.4	61.7	63.1	65.5

TABLE 45.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1959, by States and by underground, strip, and auger mining, in net tons

State	Underground mines			Strip mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama	9,172,649	8,696,718	94.8	2,713,594	2,052,559	75.6
Alaska	117,689	18,786	16.0	542,211	232,533	42.9
Arkansas	182,939	(1)	(1)	258,369	(1)	(1)
Colorado	2,742,314	[2] 788,564	[2] 28.8	551,828	[2] 222,123	[2] 40.3
Illinois	23,526,417	21,990,246	93.5	21,911,997	21,402,143	97.7
Indiana	4,644,018	3,544,847	76.3	10,159,483	6,845,257	67.4
Kansas	6,059			765,995	705,699	92.1
Kentucky	41,590,805	26,701,297	64.2	19,080,545	15,085,744	79.1
Missouri	105,956	30,543	28.8	2,641,727	1,892,311	71.6
Montana (bituminous)	143,366	5,488	3.8	8,998	4,345	48.3
New Mexico	116,828	67,153	57.5	31,722		
Ohio	9,526,722	6,841,433	71.8	24,652,980	8,951,421	36.3
Oklahoma	345,289	186,412	54.0	1,179,750	270,114	22.9
Pennsylvania	44,642,165	34,459,944	77.2	20,306,986	4,434,302	21.8
Tennessee	4,211,135	32,086	.8	1,363,701		
Utah	4,544,557	2,998,015	66.0			
Virginia	27,300,287	13,995,200	51.3	1,760,659		
Washington	218,875	207,128	94.6	23,443	23,443	100.0
West Virginia	109,411,342	83,212,886	76.1	7,242,869	2,295,978	31.7
Wyoming	330,527	52,271	15.8	1,646,281		
Other States [3]	553,716			4,110,196		
Total	283,433,655	203,829,017	71.9	120,953,334	64,417,972	53.3

Digitized by Google

TABLE 45.—Mechanical cleaning at bituminous coal and lignite mines in the United States, 1959, by States and by underground, strip, and auger mining, in net tons—Continued

State	Auger mines			Total, all mines		
	Total production	Mechanically cleaned	Percentage cleaned	Total production	Mechanically cleaned	Percentage cleaned
Alabama	60,897	55,606	91.3	11,947,140	10,804,883	90.4
Alaska				659,900	251,319	38.1
Arkansas				441,308	(1)	(1)
Colorado				3,294,142	[2] 1,010,687	[2] 30.7
Illinois	27,202	18,488	68.0	45,465,616	43,410,877	95.5
Indiana				14,803,501	10,390,104	70.2
Kansas				772,054	705,699	91.4
Kentucky	2,138,499	283,674	13.3	62,809,849	42,070,715	67.0
Missouri				2,747,683	1,922,854	70.0
Montana (bituminous)				152,364	9,333	6.5
New Mexico				148,550	67,153	45.2
Ohio	932,278	104,511	11.2	35,111,980	15,897,365	45.3
Oklahoma				1,525,039	456,526	29.9
Pennsylvania	397,937	27,604	6.9	65,347,088	38,921,850	59.6
Tennessee	337,888			5,912,724	32,086	.5
Utah				4,544,557	2,998,015	66.0
Virginia	707,894	35,356	5.0	29,768,840	14,030,556	47.1
Washington				242,318	230,571	95.2
West Virginia	3,037,918	1,014,459	33.4	119,692,129	86,523,323	72.3
Wyoming				1,976,808	52,271	2.6
Other States [3]				4,663,912		
Total	7,640,513	1,539,698	20.2	412,027,502	269,786,687	65.5

[1] Included in Colorado.
[2] Includes Arkansas.
[3] Includes Arizona, Georgia, Iowa, and Maryland and lignite from Montana, North Dakota, and South Dakota.

MECHANICAL CRUSHING

TABLE 46.—Mechanical crushing of bituminous coal and lignite at mines in the United States, 1940 and 1944–59 [1]

Year	Number of mines crushing coal	Coal crushed (net tons)	Percentage of production crushed at mines where crushing is done	Percentage of total production crushed	Percentage of production mechanically cleaned at mines where crushing is done
1940	716	35,251,061	19.3	7.7	(2)
1944	814	66,460,564	29.6	10.8	(2)
1945	830	70,936,908	32.4	12.3	(2)
1946	851	66,663,732	31.8	12.5	39.9
1947	904	88,985,858	35.7	14.1	41.4
1948	995	91,564,311	36.6	15.3	42.1
1949	1,120	77,327,691	39.0	17.7	47.3
1950	1,210	101,694,731	40.1	19.7	50.6
1951	1,374	118,663,712	39.6	22.2	54.8
1952	1,325	108,102,158	40.5	23.2	59.6
1953	1,239	116,493,415	42.5	25.5	62.7
1954	982	122,288,369	51.8	31.2	69.8
1955	1,225	161,470,318	52.8	34.8	68.4
1956	1,370	172,389,802	54.6	34.4	68.0
1957	1,452	173,098,257	52.5	35.0	70.5
1958	1,359	146,749,108	53.8	35.8	74.5
1959	1,393	151,225,633	51.9	36.7	74.3

[1] Data not available for 1941–43. Lignite and Virginia semianthracite mines are not included in 1940–49.
[2] Data not available.

Digitized by Google

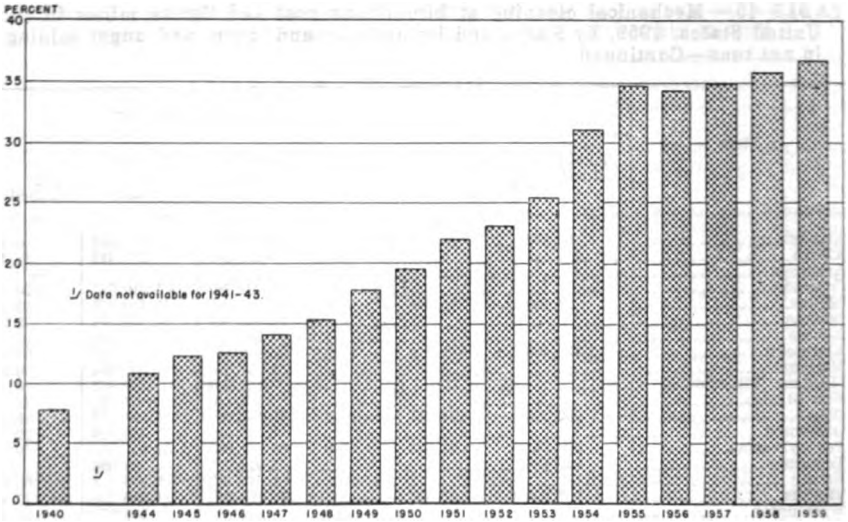

FIGURE 11.—Percentage of total production of bituminous coal and lignite crushed at mines in the United States, 1940 and 1944–59.

TABLE 47.—Mechanical crushing of bituminous coal and lignite at mines in the United States, 1958–59, by States

State	Number of mines crushing coal		Coal crushed (net tons)		Percentage of production crushed at mines where crushing is done		Percentage of total production crushed	
	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	26	26	6,143,012	6,522,634	65.4	68.4	54.9	54.6
Alaska	6	8	507,822	452,013	88.6	68.5	66.9	68.5
Arizona	1	1	3,090	3,923	83.0	90.7	40.4	53.9
Arkansas	12	12	270,808	354,989	97.4	95.2	74.4	80.4
Colorado	56	50	1,501,888	1,549,780	61.2	61.0	50.5	47.0
Illinois	81	75	19,682,043	18,651,330	49.9	45.6	44.8	41.0
Indiana	23	34	7,610,566	7,992,812	53.7	57.0	50.7	54.0
Iowa	24	24	729,508	773,874	80.1	83.1	61.9	65.6
Kansas	4	4	543,610	502,633	98.4	98.5	66.0	65.1
Kentucky	144	168	24,263,825	24,677,924	58.0	59.0	36.6	39.3
Maryland	10	16	414,326	335,441	92.3	81.6	49.5	39.8
Missouri	13	12	1,334,658	1,728,344	58.1	70.3	51.5	62.9
Montana:								
Bituminous	7	5	82,768	54,600	48.1	48.1	39.2	35.8
Lignite	1	------	73,657	------	99.9	------	78.7	------
Total Montana	8	5	156,425	54,600	63.6	48.1	51.3	15.8
New Mexico	7	6	40,315	105,501	68.3	88.1	34.6	71.0
North Dakota (lignite)	19	13	2,115,407	1,140,894	95.8	93.9	91.4	47.3
Ohio	129	138	12,549,959	13,294,292	51.4	47.2	39.2	37.9
Oklahoma	10	10	951,882	881,355	88.9	89.1	58.4	57.8
Pennsylvania	345	359	30,122,613	28,894,657	64.5	60.5	44.4	44.2
South Dakota (lignite)	1	1	1,800	5,000	9.2	22.6	9.2	22.6
Tennessee	19	19	935,695	541,969	56.2	64.8	13.8	9.2
Utah	40	38	3,442,858	2,965,121	64.7	66.7	64.6	65.2
Virginia	57	49	4,803,451	4,924,662	54.5	57.4	17.9	16.5
Washington	3	8	15,228	28,726	14.3	12.7	6.0	14.3
West Virginia	310	308	27,559,504	33,390,317	40.1	40.1	23.1	27.9
Wyoming	11	9	1,048,755	1,452,842	79.7	84.7	64.4	73.5
Total	1,359	1,393	146,749,108	151,225,633	53.8	51.9	35.8	36.7

Digitized by Google

TREATMENT FOR ALLAYING DUST

TABLE 48.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States, 1940–59 [1]

Year	Grand total production (net tons)	Total production at mines where coal was treated (net tons)	Percentage of production treated at mines where treating is done	Percentage of total production treated	Year	Net tons treated with—				
						Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	460,771,500	161,089,959	22.1	7.7	1940	2,633,201	25,767,651	4,428,113	2,807,728	35,636,783
1941	514,149,245	197,476,343	20.0	7.7	1941	3,957,459	29,258,462	2,482,899	3,844,476	39,543,296
1942	582,692,937	202,973,885	17.3	6.0	1942	10,132,809	11,302,020	6,544,658	7,148,064	35,127,551
1943	590,177,069	153,863,052	17.3	4.5	1943	15,049,176	1,720,176	1,947,219	7,966,484	26,683,055
1944	619,576,240	172,955,108	17.8	5.0	1944	7,276,702	13,188,883	4,744,580	5,562,565	30,772,730
1945	577,617,327	166,935,955	20.1	5.8	1945	5,115,090	18,875,674	4,647,872	4,910,602	33,549,238
1946	533,922,068	166,814,848	22.2	6.9	1946	4,957,622	24,310,109	3,193,070	4,572,360	37,033,161
1947	630,623,722	195,840,059	26.4	8.2	1947	5,822,483	34,667,571	5,571,953	5,732,101	51,794,108
1948	599,518,229	196,600,489	25.6	8.4	1948	6,275,121	34,466,534	4,177,987	5,462,054	50,381,696
1949	437,868,036	160,978,742	26.0	9.5	1949	3,670,120	30,448,670	4,380,961	3,275,151	41,774,902
1950	516,311,053	210,083,657	25.9	10.5	1950	4,643,186	41,688,159	4,278,212	3,724,314	54,333,871
1951	533,664,732	228,802,637	25.6	11.0	1951	4,694,938	46,142,726	4,587,940	3,172,205	58,597,809
1952	466,840,782	211,437,141	24.4	11.0	1952	4,954,080	41,409,886	3,432,199	1,772,111	51,568,276
1953	457,290,449	206,374,498	23.7	10.7	1953	3,362,552	40,671,431	2,769,833	2,154,985	48,958,801
1954	391,706,300	202,098,539	27.9	14.4	1954	2,959,979	47,782,165	3,366,955	2,255,872	56,364,971
1955	464,633,408	236,115,318	26.5	13.5	1955	3,160,729	51,157,769	5,696,447	2,513,752	62,528,697
1956	500,874,077	243,513,231	26.6	12.9	1956	5,500,522	52,008,545	4,912,374	2,309,732	64,731,173
1957	492,703,916	241,733,935	25.6	12.5	1957	4,112,934	52,051,076	3,809,132	1,852,051	61,825,193
1958	410,445,547	188,245,095	28.3	13.0	1958	3,359,434	42,922,129	4,122,397	2,862,670	53,266,630
1959	412,027,502	213,407,336	25.6	13.3	1959	2,716,638	45,139,888	3,419,852	3,403,320	54,679,698

See footnotes at end of table.

Digitized by Google

TABLE 48.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States, 1940–59 [1]—Continued

Year	Number of mines treating with—					Year	Percentage of tonnage treated with—				
	Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total [2]		Calcium chloride	Oil	Calcium chloride and oil	All other materials	Total
1940	51	486	22	62	614	1940	7.4	72.3	12.4	7.9	100.0
1941	67	564	15	58	668	1941	10.0	74.0	6.3	9.7	100.0
1942	167	334	73	117	603	1942	28.8	32.2	18.6	20.4	100.0
1943	212	67	28	101	393	1943	56.4	6.4	7.3	29.9	100.0
1944	145	192	47	83	434	1944	23.6	42.9	15.4	18.1	100.0
1945	105	296	43	67	487	1945	15.2	56.3	13.9	14.6	100.0
1946	79	380	41	51	546	1946	13.4	65.6	8.6	12.4	100.0
1947	67	384	58	45	546	1947	11.2	66.9	10.8	11.1	100.0
1948	68	474	48	46	629	1948	12.5	68.4	8.3	10.8	100.0
1949	91	586	62	34	769	1949	8.8	72.9	10.5	7.8	100.0
1950	106	688	32	45	838	1950	8.5	76.7	7.9	6.9	100.0
1951	98	764	40	27	898	1951	8.0	78.8	7.8	5.4	100.0
1952	101	723	30	20	865	1952	9.6	80.3	6.7	3.4	100.0
1953	81	681	28	26	785	1953	6.8	83.1	5.7	4.4	100.0
1954	83	614	29	29	737	1954	5.2	84.8	6.0	4.0	100.0
1955	63	650	33	28	757	1955	5.1	81.8	9.1	4.0	100.0
1956	73	642	35	30	763	1956	8.5	80.3	7.6	3.6	100.0
1957	71	665	31	34	785	1957	6.6	84.2	6.2	3.0	100.0
1958	60	596	36	33	720	1958	6.3	80.6	7.7	5.4	100.0
1959	54	615	44	37	750	1959	5.0	82.6	6.2	6.2	100.0

[1] All items except "Grand total production" exclude lignite and semianthracite, 1940–49. Data for 1940–45 include all mines with an average daily production of 50 tons and all mines with rail or river connections regardless of size. Data for 1946–59 include all mines producing 1,000 or more tons. The figures are reasonably comparable for all years.

[2] Because some mines used more than 1 method of treatment, this total is not the sum of the individual items.

Digitized by Google

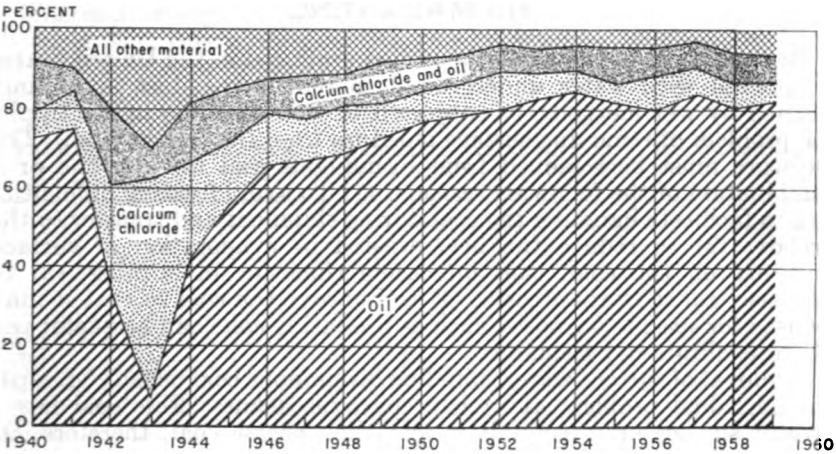

FIGURE 12.—Percentage of total bituminous coal and lignite treated for allaying dust at mines in the United States, 1940–59, by type of agent used.

TABLE 49.—Treatment of bituminous coal and lignite at mines for allaying dust in the United States, 1958–59, by States

State	Number of mines treating coal		Coal treated (net tons)		Percentage of production treated at mines where treating is done		Percentage of total production treated	
	1958	1959	1958	1959	1958	1959	1958	1959
Alabama	8	3	96,937	62,000	23.3	26.8	0.9	0.5
Arkansas	5	3	6,300	2,130	20.4	2.8	1.7	.5
Colorado	47	45	240,154	256,422	19.2	17.8	8.1	7.8
Illinois	78	75	5,212,426	4,917,588	13.4	12.3	11.9	10.8
Indiana	25	26	1,230,288	1,258,808	12.1	12.2	8.2	8.5
Iowa	6	6	13,038	15,499	8.2	10.1	1.1	1.3
Kansas	2	2	41,575	32,656	6.0	5.2	5.0	4.2
Kentucky	117	124	15,672,616	15,344,908	43.4	45.0	23.6	24.4
Maryland	2	5	53,295	23,000	95.2	55.1	6.4	2.7
Missouri	8	7	114,633	84,324	7.1	6.9	4.4	3.1
Montana:								
Bituminous	9	7	32,625	25,652	18.1	20.8	15.4	16.8
Lignite	-------	1	----------	10,000	-------	5.7	-------	5.2
Total Montana	9	8	32,625	35,652	18.1	11.9	10.7	10.3
North Dakota (lignite)	16	15	500,485	742,701	23.2	32.7	21.6	30.8
Ohio	37	42	3,908,603	4,718,892	29.4	26.8	12.2	13.4
Oklahoma	6	4	99,509	71,259	14.8	31.0	6.1	4.7
Pennsylvania	109	111	6,072,634	6,155,736	27.6	26.2	9.0	9.4
South Dakota (lignite)	1	1	1,500	4,850	7.7	21.9	7.7	21.9
Tennessee	2	3	19,200	6,050	14.6	5.1	.3	.1
Utah	34	40	1,469,217	1,634,515	40.6	48.1	27.6	36.0
Virginia	36	35	3,421,589	2,759,912	39.8	30.0	12.8	9.3
Washington	1	-------	900	----------	1.0	-------	.4	-------
West Virginia	157	174	14,805,983	16,308,979	31.8	24.3	12.4	13.6
Wyoming	14	14	253,123	243,817	16.4	16.9	15.5	12.3
Total	720	743	53,266,630	54,679,698	28.3	25.6	13.0	13.3

Digitized by Google

THERMAL DRYING

Because most of the bituminous coal produced in the United States is sprayed with water underground to reduce the dust in mining, cleaned by wet methods, or subjected to wet screening in the tipple, the problem of removing surface moisture from the coal is vital. The moisture must be removed from bituminous coal for any one or a combination of the following reasons: (1) To avoid freezing difficulties and to facilitate handling the coal during shipment and transfer to the firebox; (2) to reduce the heat wasted in evaporation of surface moisture on the coal, thus increasing efficiency in burning; (3) to decrease transportation costs; (4) to improve the coal so that it may be used for specific purposes, such as producing coke and briquets; and (5) to facilitate dry cleaning.

Removal of surface water from fine bituminous coal usually presents an individual problem at each preparation plant. Fine coal has a greater surface area per unit weight than coarse coal; therefore, its capacity for retaining moisture is proportionately greater. Removing water from coarse coal is relatively easy, but the problem is greater with coal that is 10-mesh or finer. A detailed report on Dewatering and Thermal Drying by Orville R. Lyons was published in AIME Coal Preparation, 1950, pp. 648–715.

The two components of the total moisture content of wetwashed coal are inherent and surface moisture. Inherent moisture is that present in the coal in the bed. Surface moisture is that attached to the surface of the coal particles or retained in cracks and fissures other than capillary openings in the coal substance.

There are three principal methods of removing surface moisture from coal: (1) Gravity drainage, (2) mechanical dewatering, and (3) thermal drying. Thermal drying is generally used on coals that cannot be readily dried by gravity drainage or mechanical means, such as screens, centrifuges, and filters.

The annual reports of bituminous coal and lignite producers to the Bureau of Mines for 1957 included data on thermal drying for the first time. These and succeeding reports have included data on thermal drying only at the preparation plant and have not included thermal drying at powerplants or other industrial plants.

Thermal driers have been arranged into six groups: (1) Rotary, (2) screen, (3) vertical tray and cascade, (4) continuous carrier, (5) suspension or flash (including fluidized-bed), and (6) multilouvre driers. A few producers did not furnish figures by type of equipment, and estimates were made for these plants.

Each thermal drier has been designed to handle definite sizes of coal, Table 51 shows the minimum and maximum top sizes of bituminous coal dried by the various types of driers in use in 1959. The size of feed data listed in this table are from reports submitted by bituminous coal producers and may not include all sizes that the driers will handle. The sizes of coal most commonly reported as thermally dried in 1959 were ⅜ by 0 inch and ¼ by 0 inch.

Table 52 compares, by States, bituminous coal thermally dried with that mechanically cleaned. In 10 States mines that operated bituminous coal cleaning plants in 1959 did no thermal drying.

Digitized by Google

Thermal drying of bituminous coal by States in 1958–59 is shown in table 53. Bituminous coal thermally dried in 1959 amounted to 36 million tons, or approximately 9 percent of the total production in the United States.

TABLE 50.—Thermal drying of bituminous coal and lignite in the United States, by type of drying equipment, 1958–59

Type of drier	Number of thermal drying units		Net tons thermally dried		Percentage of total	
	1958	1959	1958	1959	1958	1959
Rotary	6	9	405,067	717,948	1.3	2.0
Screen	59	61	7,094,868	7,458,410	22.5	20.9
Vertical tray and cascade	58	57	5,775,347	5,682,861	18.3	15.9
Continuous carrier	5	5	679,222	922,922	2.2	2.6
Suspension or flash, including fluidized-bed	50	60	8,171,253	11,247,701	25.9	31.4
Multilouvre	50	55	9,416,368	9,734,894	29.8	27.2
Total	228	247	31,542,125	35,764,736	100.0	100.0

TABLE 51.—Relation between size of feed and type of thermal drier used at bituminous coal and lignite mines in the United States, 1959

Type of drier	Top size reported		Type of drier	Top size reported	
	Minimum, in inches	Maximum, in inches		Minimum, in inches	Maximum, in inches
Suspension or flash and fluidized-bed	[1] 10	1	Vertical tray and cascade	¼	1½
Multilouvre	⅛	1½	Screen	5/16	2
Rotary	3/16	¾	Continuous carrier	¾	1

[1] Mesh.

TABLE 52.—Comparison of thermal drying of bituminous coal and lignite with mechanical cleaning at mines in the United States, 1958–59, by States

State	Total number of cleaning plants		Number of cleaning plants with thermal drying		Production mechanically cleaned (net tons)		Net tons thermally dried		Percentage of cleaned coal thermally dried	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
Illinois	61	58	17	18	41,440,230	43,410,877	3,705,169	4,476,607	8.9	10.3
Indiana	19	20	10	11	10,503,303	10,399,104	2,607,665	2,289,895	24.8	22.0
Kentucky	79	81	9	8	41,065,537	42,070,715	2,533,529	2,257,854	6.2	5.4
Ohio	24	23	5	5	14,651,854	15,897,365	1,493,290	1,693,240	10.2	10.7
Pennsylvania	94	89	11	12	39,957,169	38,921,850	3,283,452	3,766,257	8.2	9.7
Utah	6	6	2	3	3,362,093	2,998,015	315,570	544,590	9.4	18.2
Virginia	39	29	4	5	10,566,897	14,039,556	2,617,446	4,100,214	24.8	29.2
Washington	5	5	2	2	240,094	230,571	107,226	72,000	44.7	31.2
West Virginia	192	184	40	40	82,258,768	86,523,323	14,878,778	16,564,079	18.1	19.1
Other States	63	60	------	------	14,988,906	15,313,311	------	------	------	------
Total	573	555	100	104	259,034,851	269,786,687	31,542,125	35,764,736	12.2	13.3

Digitized by Google

TABLE 53.—Thermal drying of bituminous coal and lignite at mines in the United States, 1958–59, by States

State	Number of thermal drying units		Grand total production (net tons)		Net tons thermally dried		Percentage of total production thermally dried	
	1958	1959	1958	1959	1958	1959	1958	1959
Illinois	41	44	43,912,405	45,465,616	3,705,169	4,476,607	8.4	9.8
Indiana	28	30	15,022,224	14,803,501	2,607,665	2,289,895	17.4	15.5
Kentucky	15	13	66,311,805	62,809,849	2,533,529	2,257,854	3.8	3.6
Ohio	16	16	32,028,396	35,111,980	1,493,290	1,693,240	4.7	4.8
Pennsylvania	25	27	67,770,862	65,347,088	3,283,452	3,766,257	4.8	5.8
Utah	2	3	5,327,516	4,544,557	315,570	544,590	5.9	12.0
Virginia	12	19	26,826,067	29,768,840	2,617,446	4,100,214	9.8	13.8
Washington	3	3	252,269	242,318	107,226	72,000	42.5	29.7
West Virginia	86	92	119,467,697	119,692,129	14,878,778	16,564,079	12.5	13.8
Other States			33,526,306	34,241,624				
Total	228	247	410,445,547	412,027,502	31,542,125	35,764,736	7.7	8.7

PRODUCTION BY STATES AND COUNTIES

Detailed production and employment statistics are shown in table 54 for each coal-producing county in the United States from which three or more operators submitted reports for 1959. Statistics on counties with less than three reporting producers have been combined with data for "Other counties" to avoid disclosing individual figures, except when the Bureau has been granted permission to publish statistics separately. Production of mines on the border between two States has been credited to the State in which the coal was mined rather than to the State in which the tipple was located. If the coal was mined in both States, the tonnage was apportioned accordingly.

Bituminous coal and lignite were mined in 26 States and 331 counties in 1959. As soft coal is the source of a large part of the economic activity in many counties, the key items pertaining to the industry are published by counties and are useful in analyzing potential markets. These key items are (1) method of shipping the coal, (2) value, (3) number of men working daily, (4) days worked, and (5) tons per man per day.

The most striking fact shown by the following table is the wide variation among several counties in the same State, not only in production but also in average value and average tons per man per day. The differences in average value are due to quality of coal, method of transportation, or market conditions. The differences in output per man per day are caused largely by physical conditions, mining methods, and extent of mechanization.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ALABAMA									
Bibb	22,667	5,565	----------	28,232	$4.21	74	67	4,953	5.70
Blount	132,439	92,248	----------	224,687	5.82	102	208	21,228	10.58
Cullman	61,705	13,648	----------	75,353	5.35	59	177	10,457	7.21
Jackson	----------	14,901	----------	14,901	5.21	10	200	2,000	7.50
Jefferson	7,203,085	297,128	13,054	7,513,267	6.85	4,400	224	986,189	7.62
Marion	111,816	76,145	----------	187,961	6.64	218	189	41,227	4.56
Shelby	12,445	53,327	----------	65,772	6.53	114	197	22,448	2.93
Tuscaloosa	648,225	14,647	1,308	664,180	4.52	222	173	38,417	17.29
Walker	1,142,864	225,729	1,691,657	3,060,250	6.40	1,467	188	276,043	11.09
Winston	----------	----------	112,537	112,537	5.17	28	219	6,150	18.30
Total Alabama	9,335,246	793,338	1,818,556	11,947,140	6.55	6,694	211	1,409,112	8.48
ALASKA									
Total Alaska	652,829	3,724	3,347	659,900	$8.89	248	231	57,196	11.54
ARIZONA									
Coconino	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Navajo	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Total Arizona	----------	7,284	----------	7,284	$8.64	17	160	2,717	2.68
ARKANSAS									
Franklin	35,528	----------	----------	35,528	$6.60	10	151	1,510	23.53
Johnson	148,544	150	----------	148,694	8.07	122	114	13,889	10.71
Logan	9,302	426	----------	9,728	9.88	50	49	2,432	4.00
Pope	66,708	----------	----------	66,708	6.84	20	304	6,075	10.98
Sebastian	174,025	6,625	----------	180,650	8.27	293	133	38,938	4.64
Total Arkansas	434,107	7,201	----------	441,308	7.89	495	127	62,844	7.02
COLORADO									
Delta	39,631	28,949	968	69,548	$5.18	53	171	9,032	7.70
El Paso	----------	4,392	----------	4,392	7.51	3	145	435	10.10
Fremont	6,973	273,050	90	280,113	3.57	121	199	24,104	11.62
Garfield	----------	16,767	----------	16,767	6.19	25	134	3,353	5.00
Gunnison	198,668	54,717	9,546	262,931	5.73	196	170	33,367	7.88
Huerfano	16,749	42,995	----------	59,744	5.98	61	166	10,143	5.89
Jackson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
La Plata	10,441	17,556	18	28,015	4.61	26	178	4,623	6.06
Las Animas	671,794	18,484	3,128	693,406	11.91	783	205	160,511	4.32
Mesa	----------	16,639	72,038	88,677	5.95	61	211	12,889	6.88
Moffat	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Montrose	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pitkin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rio Blanco	----------	10,840	----------	10,840	6.14	6	193	1,157	9.37
Routt	357,765	38,595	919	397,279	3.75	102	191	19,515	20.36
Weld	582,048	190,587	9,176	781,811	4.45	261	214	55,804	14.01
Other counties	533,453	67,146	20	600,619	6.19	236	184	43,455	13.82
Total Colorado	2,417,522	780,717	95,903	3,294,142	6.39	1,934	196	378,388	8.71

See footnotes at end of table.

569112—60——8

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
GEORGIA									
Walker		6,767		6,767	$5.00	18	183	3,301	2.05
ILLINOIS									
Adams		36,862	225	37,087	$4.42	16	179	2,864	12.95
Brown		1,482		1,482	4.42	4	96	383	3.87
Bureau	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Christian	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clinton	2,688	38,482	1,838	43,008	4.45	83	155	12,838	3.35
Douglas	265,142	215,354	1,859	482,355	4.48	95	242	22,947	21.02
Franklin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fulton	4,730,300	367,498	14,823	5,112,621	4.18	836	242	202,602	25.23
Gallatin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Greene		7,433		7,433	5.00	2	315	630	11.80
Henry	86,850	5,276	83	92,209	4.49	46	199	9,148	10.08
Jackson	1,167,956	74,560	3,431	1,245,947	4.13	320	231	74,049	16.83
Jefferson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Kankakee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Knox	2,194,359	2,000		2,196,359	4.17	273	209	57,033	38.51
La Salle			6,756	6,756	4.53	15	73	1,093	6.18
Livingston			1,181	1,181	9.00	4	150	600	1.97
Logan		24,500	111	24,611	6.64	20	191	3,810	6.46
Macoupin	309,992	58,870	6,313	375,175	4.20	253	175	44,242	8.48
Madison	56,512	551,780	2,600	610,892	4.33	313	186	58,236	10.49
Marion	9,506	6,652	2,105	18,263	4.61	33	152	5,017	3.64
Menard		13,168	60	13,228	6.11	24	133	3,180	4.16
Mercer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Montgomery	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Peoria		324,023	484	324,507	5.10	90	187	16,785	19.33
Perry	3,317,536	187,458	5,203	3,510,197	3.46	552	258	142,608	24.61
Randolph	862,850	60,005	167	923,022	3.46	171	219	37,448	24.65
St. Clair	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Saline	2,533,910	27,942	7,774	2,569,626	4.17	743	193	143,347	17.93
Sangamon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Schuyler	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Vermilion	921,663	292,160	2,973	1,216,796	4.50	208	225	46,827	25.98
Wabash		1,317		1,317	5.00	2	131	262	5.03
Washington	4,281	20,440	460	25,181	4.97	48	126	6,039	4.17
Will	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Williamson	5,901,486	233,471	7,010	6,141,967	4.08	1,459	220	320,341	19.17
Other counties	17,523,782	2,891,387	69,227	20,484,396	4.04	4,938	209	1,030,647	19.88
Total Illinois	39,888,813	5,442,120	134,683	45,465,616	4.06	10,548	213	2,242,976	20.27
INDIANA									
Clay	564,525	333,172	2,260	899,957	$4.18	183	251	45,915	19.60
Dubois		21,063		21,063	4.21	15	162	2,435	8.65
Fountain		27,312		27,312	6.79	19	220	4,176	6.54
Gibson	398,003	79,460	18,446	495,909	4.50	349	154	53,728	9.23
Greene	1,414,527	112,668		1,527,195	4.36	351	200	70,209	21.75
Knox	1,033,597	89,839	2,260	1,125,696	3.89	363	197	71,613	15.72
Martin	652	30,777		31,429	4.45	10	233	2,330	13.49
Owen	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Parke	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pike	1,897,340	128,656	1,200	2,027,196	3.90	402	259	103,995	19.49
Spencer	26,826	48,451	6,074	81,351	4.25	30	193	5,793	14.04
Sullivan	466,740	180,272	205,282	852,294	4.28	372	202	75,142	11.34
Vermillion	19,156	20,230		39,386	5.37	79	56	4,439	8.87
Vigo	1,789,491	227,481	622,412	2,639,384	4.38	861	217	186,513	14.15
Warrick	4,564,874	282,993	5,796	4,853,663	3.70	578	228	131,704	36.85
Other counties	139,923	41,743		181,666	4.81	60	160	9,591	18.94
Total Indiana	12,315,654	1,624,117	863,730	14,803,501	4.05	3,672	209	767,583	19.29

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
IOWA									
Appanoose	17,986	60,696	666	79,348	$4.84	172	130	22,405	3.54
Keokuk	----------	1,927	3	1,930	5.50	4	90	360	5.36
Lucas	25,096	15,981	----------	41,077	4.50	18	273	4,911	8.36
Mahaska	181,264	44,692	----------	225,956	3.59	60	277	16,639	13.58
Marion	490,600	190,930	401	681,931	3.34	164	247	40,432	16.87
Monroe	28,775	53,140	----------	81,915	3.46	66	165	10,913	7.51
Polk	----------	1,519	----------	1,519	3.73	2	35	70	21.70
Van Buren	----------	17,094	----------	17,094	4.65	8	156	1,248	13.70
Wapello	----------	46,723	10	46,733	3.60	23	247	5,679	8.23
Warren	----------	2,395	2	2,397	3.73	2	150	300	7.99
Total Iowa	743,721	435,097	1,082	1,179,900	3.57	519	198	102,957	11.46
KANSAS									
Bourbon	----------	4,008	----------	4,008	$4.12	4	224	895	4.48
Cherokee	429,818	58,192	63	488,073	4.55	118	260	30,696	15.90
Coffey	----------	2,230	----------	2,230	4.66	2	154	308	7.24
Crawford	239,053	33,126	474	272,653	4.85	89	246	21,923	12.44
Osage	----------	5,090	----------	5,090	7.42	12	150	1,805	2.82
Total Kansas	668,871	102,646	537	772,054	4.67	225	247	55,627	13.88
KENTUCKY									
Eastern Kentucky:									
Bell	873,472	241,792	4,046	1,119,310	$3.89	621	135	83,565	13.39
Boyd	----------	115,326	1,040	116,366	4.55	88	140	12,317	9.45
Breathitt	572,025	16,029	676	588,730	6.07	278	215	59,770	9.85
Carter	32,560	15,566	100	48,226	4.85	59	149	8,764	5.50
Clay	694,209	328,412	210	1,022,831	4.13	1,297	156	201,752	5.07
Clinton	----------	22,642	----------	22,642	4.21	42	121	5,065	4.47
Elliott	----------	12,406	----------	12,406	4.00	14	189	2,651	4.68
Floyd	3,542,672	195,938	5,769	3,744,379	5.80	2,309	179	413,287	9.06
Greenup	----------	9,635	----------	9,635	5.05	27	150	4,048	2.38
Harlan	4,898,791	284,680	21,689	5,205,160	5.95	3,499	169	590,074	8.82
Jackson	----------	138,385	----------	138,385	4.42	201	121	24,321	5.69
Johnson	192,150	64,244	650	257,044	3.71	365	110	40,100	6.41
Knott	609,965	461,932	----------	1,071,897	3.22	978	114	111,434	9.62
Knox	60,467	45,673	----------	106,140	3.28	171	100	17,031	6.23
Laurel	232,738	104,385	----------	337,123	4.04	222	139	30,881	10.92
Lawrence	----------	42,787	----------	42,787	4.55	129	76	9,836	4.35
Lee	69,956	43,541	----------	113,497	4.79	120	189	22,714	5.00
Leslie	2,097,704	711,705	3,758	2,813,167	4.28	1,674	177	296,370	9.49
Letcher	3,382,162	437,486	23,536	3,843,184	5.38	1,893	168	318,952	12.05
McCreary	364,342	161,901	----------	526,243	4.04	382	160	61,115	8.61
Magoffin	114,646	72,620	----------	187,266	2.38	260	98	25,592	7.32
Martin	54,281	1,000	----------	55,281	3.40	44	156	6,842	8.08
Morgan	----------	129,778	----------	129,778	4.74	190	76	14,439	8.99
Owsley	----------	41,823	----------	41,823	3.67	14	149	2,091	20.00
Perry	3,919,008	162,286	6,234	4,087,528	4.61	1,817	193	350,087	11.68
Pike	6,426,154	364,809	85,227	6,876,190	5.10	3,890	162	628,955	10.93
Pulaski	114,585	89,241	----------	203,826	3.70	86	187	16,061	12.69
Rockcastle	88,294	19,296	----------	107,590	3.43	83	156	12,979	8.29
Wayne	----------	7,226	----------	7,226	6.09	13	101	1,319	5.48
Whitley	185,561	160,049	253	345,863	3.27	656	123	80,648	4.29
Wolfe	----------	12,800	----------	12,800	4.71	19	147	2,793	4.58
Total Eastern Kentucky	28,525,742	4,515,393	153,188	33,194,323	4.99	21,441	161	3,455,853	9.61

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
KENTUCKY—Continued									
Western Kentucky:									
Butler		202,802		202,802	3.96	81	155	12,584	16.12
Caldwell	35,857			35,857	3.00	13	228	2,968	12.08
Christian	34,989	1,072		36,061	5.03	21	116	2,435	14.81
Daviess	601,433	202,571		804,004	2.90	93	242	22,474	35.77
Hancock		5,367		5,367	4.38	3	91	274	19.59
Henderson		280,730	1,060	281,790	3.02	128	246	31,450	8.96
Hopkins	10,687,106	436,980	631	11,124,717	3.76	2,828	209	591,096	18.82
McLean		1,200		1,200	3.26	2	60	120	10.00
Muhlenberg	9,745,789	73,429	2,319	9,821,537	3.34	1,571	205	322,135	30.49
Ohio	3,269,979	24,046	891	3,294,916	3.23	353	238	84,036	39.21
Union	2,727,953	7,131	351	2,735,435	3.99	660	244	161,344	16.95
Webster	1,263,510	8,330		1,271,840	3.02	234	220	51,408	24.74
Total Western Kentucky	28,366,616	1,243,658	5,252	29,615,526	3.52	5,987	214	1,282,324	23.10
Total Kentucky	56,892,358	5,759,051	158,440	62,809,849	4.30	27,428	173	4,738,177	13.26
MARYLAND									
Allegany	41,587	204,011	27	245,625	$3.78	221	175	38,575	6.37
Garrett	320,079	276,723		596,802	3.79	372	200	74,358	8.03
Total Maryland	361,666	480,734	27	842,427	3.78	593	190	112,933	7.46
MISSOURI									
Adair		48,411	1,726	50,137	$4.79	64	176	11,241	4.46
Barton	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Bates	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Callaway	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Clark		10,902		10,902	5.80	9	192	1,728	6.31
Dade		17,000		17,000	5.00	9	285	2,564	6.63
Harrison		2,141		2,141	7.00	8	162	1,298	1.65
Henry	694,145	27,449	569,967	1,291,561	4.08	204	196	39,937	32.34
Lafayette		7,960	62	8,022	7.22	33	171	5,649	1.42
Linn	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Macon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Putnam		99,145		99,145	4.37	52	180	9,363	10.59
Ralls		4,000		4,000	6.00	6	100	600	6.67
Randolph	530,882	54,465	4,190	589,537	4.52	1,631	91	149,024	3.96
Schuyler	17,236	1,704		18,940	2.64	6	200	1,200	15.78
St. Clair	275,509	2,919	208	278,726	4.47	57	258	14,678	18.99
Vernon	75,047	12,848	62	87,957	3.84	30	187	5,610	15.68
Other counties	118,716	170,735	164	289,615	5.01	108	225	24,331	11.90
Total Missouri	1,711,625	459,679	576,379	2,747,683	4.34	2,217	121	267,223	10.28

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
MONTANA									
Bituminous coal:									
Blaine	----------	4,550	100	4,650	$8.09	5	321	1,603	2.90
Carbon	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Cascade	----------	1,922	----------	1,922	6.40	3	105	314	6.12
Hill	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Musselshell	91,181	36,431	101	127,713	7.01	149	123	18,323	6.97
Rosebud	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	2,537	14,819	723	18,079	7.21	26	201	5,217	3.47
Total bituminous coal	93,718	57,722	924	152,364	7.06	183	139	25,457	5.99
Lignite:									
Custer	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Dawson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Richland	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sheridan	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	175,574	17,163	54	192,791	2.08	36	195	7,030	27.42
Total lignite	175,574	17,163	54	192,791	2.08	36	195	7,030	27.42
Total Montana	269,292	74,885	978	345,155	4.28	219	148	32,487	10.62
NEW MEXICO									
Colfax	67,017	15,206	136	82,359	$6.29	106	245	25,981	3.17
McKinley	25,000	25,284	32	50,316	4.62	55	214	11,775	4.27
Rio Arriba	5,260	2,570	----------	7,830	5.91	19	117	2,231	3.51
Sandoval	----------	1,245	----------	1,245	3.11	4	120	480	2.59
San Juan	----------	6,750	50	6,800	5.40	18	156	2,810	2.42
Total New Mexico	97,277	51,055	218	148,550	5.64	202	214	43,277	3.43
NORTH DAKOTA (LIGNITE)									
Adams	8,665	11,545	100	20,310	$3.53	8	192	1,536	13.22
Bowman	157,609	----------	----------	157,609	1.77	12	231	2,777	56.76
Burke	317,560	29,627	52,110	399,297	2.33	46	232	10,676	37.40
Burleigh	----------	14,382	----------	14,382	3.31	3	204	612	23.50
Divide	169,741	37,629	----------	207,370	2.88	35	244	8,556	24.24
Dunn	----------	5,985	150	6,135	2.91	6	150	900	6.82
Grant	----------	24,305	----------	24,305	3.23	5	157	787	30.88
Hettinger	300	6,511	----------	6,811	3.39	13	89	1,156	5.89
McLean	35,577	55,783	200	91,560	3.24	23	148	3,413	26.83
Mercer	841,414	30,204	53,439	925,057	1.95	100	214	21,438	43.15
Morton	----------	24,066	----------	24,066	2.50	10	184	1,840	13.08
Oliver	----------	10,748	----------	10,748	2.46	3	127	380	28.28
Stark	----------	62,953	----------	62,953	1.81	6	197	1,182	53.26
Ward	252,117	64,118	142,529	458,764	2.33	48	233	11,198	40.97
Williams	----------	3,251	----------	3,251	4.72	5	152	761	4.27
Total North Dakota	1,782,983	381,107	248,528	2,412,618	2.25	323	208	67,212	35.90

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
OHIO									
Athens	114,045	243,660	1,546	359,251	$4.47	254	178	45,294	7.93
Belmont	6,260,188	250,641	19,165	6,529,994	4.23	2,074	198	410,513	15.91
Carroll	79,250	332,675	13,401	425,326	3.77	178	224	39,856	10.67
Columbiana	14,856	1,541,375	----------	1,556,231	3.62	396	255	100,983	15.41
Coshocton	277,171	1,444,299	2	1,721,472	3.97	370	262	96,787	17.79
Gallia	842,672	16,538	1,473	860,683	3.45	225	233	52,419	16.42
Guernsey	215,085	34,570	778	250,433	4.16	139	160	22,194	11.28
Harrison	5,551,742	636,796	1,405,708	7,594,246	4.32	1,882	227	426,478	17.81
Hocking	----------	58,950	----------	58,950	4.84	64	120	7,677	7.68
Holmes	----------	94,970	80	95,050	3.07	25	165	4,135	22.99
Jackson	25,234	239,453	----------	264,687	4.03	107	191	20,482	12.92
Jefferson	2,228,029	1,173,229	6,814	3,408,072	3.77	913	213	194,563	17.52
Lawrence	75,520	215,579	----------	291,099	5.03	50	243	12,149	23.96
Mahoning	----------	904,268	285	904,553	4.12	175	285	49,948	18.11
Meigs	319,079	166,864	----------	485,943	3.19	130	210	27,245	17.84
Morgan	3,673	9,500	2,355,855	2,369,118	3.21	265	242	64,260	36.87
Muskingum	13,780	441,202	----------	454,982	2.87	176	177	31,099	14.63
Noble	1,018,783	422,272	----------	1,441,055	2.56	170	219	37,221	38.72
Perry	1,552,625	571,698	----------	2,124,323	3.71	396	237	93,956	22.61
Portage	----------	103,590	4,830	108,420	3.58	28	294	8,226	13.18
Stark	----------	602,227	109	602,336	3.20	166	252	41,810	14.41
Tuscarawas	148,482	2,377,405	24,613	2,550,500	3.66	847	218	185,061	13.78
Vinton	82,542	187,417	----------	269,959	4.23	164	230	37,706	7.16
Washington	1,944	296,456	----------	298,400	2.99	59	221	13,059	22.85
Wayne	----------	86,897	----------	86,897	2.79	22	195	4,287	20.27
Total Ohio	18,824,700	12,452,621	3,834,659	35,111,980	3.86	9,275	219	2,027,408	17.32
OKLAHOMA									
Craig	51,646	72,390	----------	124,036	$3.80	41	241	9,868	12.57
Haskell	276,163	1,481	----------	277,644	7.10	106	145	15,377	18.06
Le Flore	201,901	1,948	112	203,961	9.09	243	149	36,123	5.65
McIntosh	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Nowata	----------	5,669	----------	5,669	6.57	4	50	200	28.35
Okmulgee	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pittsburg	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rogers	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Sequoyah	161,631	----------	----------	161,631	7.72	29	276	8,013	20.17
Other counties	731,404	20,337	357	752,098	6.24	442	227	100,445	7.49
Total Oklahoma	1,422,745	101,825	469	1,525,039	6.74	865	197	170,026	8.97
PENNSYLVANIA									
Allegheny	3,361,383	1,267,991	137,189	4,766,563	$5.99	2,683	182	489,605	9.74
Armstrong	2,066,734	636,341	3,485	2,706,560	4.13	1,141	222	252,966	10.70
Beaver	----------	271,403	----------	271,403	3.38	103	196	20,147	13.47
Bedford	300	158,742	2,150	161,192	3.29	183	140	25,637	6.29
Blair	16,744	61,504	----------	78,248	4.31	55	203	11,162	7.01
Bradford	----------	6,798	----------	6,798	3.66	3	215	645	10.54
Butler	886,324	1,121,376	690	2,008,390	3.63	601	213	128,099	15.68
Cambria	6,293,946	369,186	570,241	7,233,373	5.81	6,194	157	971,671	7.44
Cameron	7,961	42,926	----------	50,887	3.37	23	233	5,362	9.49
Centre	382,210	343,191	----------	725,401	4.06	322	215	69,117	10.50
Clarion	2,073,084	825,979	5,914	2,904,977	3.56	667	259	172,580	16.83
Clearfield	5,249,314	794,308	4,501	6,048,123	3.91	2,502	208	521,029	11.61
Clinton	496,381	142,213	10	638,604	3.74	137	241	33,050	19.32
Elk	143,541	163,776	103	307,420	4.38	198	181	35,847	8.58
Fayette	2,275,072	359,234	49,959	2,684,265	6.17	2,420	175	422,776	6.35
Greene	9,594,906	28,196	20,156	9,643,258	6.34	4,982	195	970,616	9.94
Huntingdon	2,991	59,332	16	62,339	3.92	72	145	10,404	5.99
Indiana	5,268,764	376,564	553,765	6,199,093	5.14	3,283	186	610,023	10.16

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
PENNSYLVANIA—Continued									
Jefferson	787,835	106,262	733	894,830	3.61	708	129	91,010	9.83
Lawrence	2,580	999,051	650	1,002,281	3.24	205	245	50,137	19.99
Lycoming	----------	57,103	----------	57,103	3.65	28	199	5,560	10.27
McKean	----------	35,818	6,475	42,293	4.08	17	164	2,793	15.14
Mercer	186,475	337,785	320	524,580	3.79	235	189	44,315	11.84
Somerset	1,543,729	513,565	6,104	2,063,398	4.17	1,600	138	220,322	9.37
Tioga	----------	260,477	548	261,025	4.65	99	215	21,257	12.28
Venango	300,876	251,092	292	552,260	3.72	115	245	28,119	19.64
Washington	8,542,965	1,345,668	140,223	10,028,856	6.43	5,876	173	1,016,985	9.86
Westmoreland	2,130,757	627,563	665,248	3,423,568	5.43	1,871	172	321,478	10.65
Total Pennsylvania	51,614,872	11,563,444	2,168,772	65,347,088	5.28	36,323	180	6,552,712	9.97
SOUTH DAKOTA (LIGNITE)									
Dewey	----------	21,825	300	22,125	$4.01	9	252	2,269	9.75
TENNESSEE									
Anderson	268,124	798,220	853	1,067,197	$4.29	561	157	88,102	12.11
Bledsoe	25,065	15,584	----------	40,649	3.50	57	98	5,607	7.25
Campbell	290,746	179,411	152	470,309	3.47	593	119	70,523	6.67
Claiborne	157,136	1,278	80	158,494	4.36	207	97	20,065	7.90
Cumberland	49,558	57,449	----------	107,007	3.44	142	125	17,740	6.03
Fentress	113,761	8,883	----------	122,644	3.11	456	85	38,797	3.16
Grundy	151,701	22,136	----------	173,837	4.00	55	185	10,201	17.04
Hamilton	13,233	33,532	----------	46,765	3.34	91	99	9,049	5.17
Marion	1,314,274	292,728	----------	1,607,002	4.43	1,103	155	171,209	9.39
Morgan	75,626	458,805	16,817	551,248	4.07	536	221	118,489	4.65
Overton	86,585	5,504	----------	92,089	3.00	286	79	22,571	4.08
Putnam	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rhea	2,800	124,347	----------	127,147	2.35	245	92	22,584	5.63
Scott	391,550	120,332	----------	511,882	3.82	402	142	57,156	8.96
Sequatchie	310,824	34,546	----------	345,370	3.10	288	142	40,915	8.44
Van Buren	30,299	40,324	----------	70,623	3.16	87	124	10,754	6.57
White	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	376,884	43,577	----------	420,461	4.15	129	234	30,180	13.93
Total Tennessee	3,658,166	2,236,656	17,902	5,912,724	3.99	5,238	140	733,947	8.06
UTAH									
Carbon	3,297,254	133,995	15,147	3,446,396	$6.30	1,682	198	332,985	10.35
Emery	803,204	180,988	4,617	988,809	5.76	489	211	103,216	9.58
Iron	----------	42,393	----------	42,393	4.91	17	248	4,210	10.07
Kane	----------	1,300	----------	1,300	4.91	2	195	390	3.33
Sevier	----------	47,250	----------	47,250	6.00	12	263	3,150	15.00
Summit	----------	18,409	----------	18,409	4.44	10	243	2,425	7.59
Total Utah	4,100,458	424,335	19,764	4,544,557	6.16	2,212	202	446,376	10.18

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
VIRGINIA									
Buchanan	7,501,819	2,802,279	15,593	10,319,691	$4.36	7,151	192	1,371,980	7.52
Dickenson	6,670,388	899,048	----------	7,569,436	4.68	2,134	234	498,644	15.18
Lee	323,450	127,252	317	451,019	3.72	727	117	84,896	5.31
Montgomery	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Russell	2,172,733	391,239	----------	2,563,972	5.10	1,042	196	203,923	12.57
Scott	----------	13,636	----------	13,636	4.55	11	207	2,273	6.00
Tazewell	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Wise	5,534,329	503,926	297,012	6,335,267	4.55	2,913	200	582,648	10.87
Other counties	2,291,152	216,592	8,075	2,515,819	6.02	1,674	177	295,679	8.51
Total Virginia	24,493,871	4,953,972	320,997	29,768,840	4.68	15,652	194	3,040,045	9.79
WASHINGTON									
King	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Kittitas	114,471	6,819	4,360	125,650	[$7.58	198	162	32,145	3.91
Lewis	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Thurston	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Other counties	61,218	55,450	----------	116,668	7.62	131	236	30,851	3.78
Total Washington	175,689	62,269	4,360	242,318	7.60	329	191	62,996	3.85
WEST VIRGINIA									
Barbour	3,051,896	44,682	505	3,097,083	$4.33	1,155	184	212,890	14.55
Boone	6,282,428	14,378	9,968	6,306,774	4.74	2,283	207	472,855	13.34
Braxton	131,870	----------	----------	131,870	4.21	168	90	15,061	8.76
Brooke	131,124	95,881	143,807	370,812	5.58	247	200	49,340	7.52
Clay	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Fayette	4,663,754	138,789	6,461	4,809,004	5.24	3,467	169	586,363	8.20
Gilmer	419,253	3,119	----------	422,372	3.64	187	184	34,410	12.27
Grant	----------	75,145	----------	75,145	3.25	67	187	12,556	5.98
Greenbrier	519,907	150,628	277	670,812	4.53	432	143	61,656	10.88
Harrison	6,380,723	156,205	867	6,537,795	4.38	2,231	192	428,014	15.27
Kanawha	9,060,259	328,801	4,300	9,393,360	4.80	3,630	204	739,610	12.70
Lewis	943,029	----------	11,271	954,300	3.39	157	220	34,579	27.60
Logan	16,493,279	161,481	26,046	16,680,806	4.72	6,859	212	1,451,619	11.49
Marion	9,304,219	35,956	7,372	9,347,547	5.40	3,441	193	662,780	14.10
Marshall	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Mason	207,389	289,545	----------	496,934	3.23	183	218	39,975	12.43
McDowell	12,948,483	284,420	289,451	13,522,354	6.82	7,145	187	1,338,356	10.10
Mercer	766,563	28,429	4,197	799,189	5.25	481	148	71,077	11.24
Mineral	20,035	28,810	8	48,853	4.20	89	76	6,760	7.23
Mingo	6,431,910	113,118	10,773	6,555,801	4.89	2,197	209	460,195	14.25
Monongalia	7,202,855	72,820	902	7,276,577	5.10	2,336	197	459,838	15.82
Nicholas	4,494,686	272,467	34,800	4,801,953	4.97	2,804	172	481,355	9.98
Ohio	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pocahontas	444,336	7,203	----------	451,539	4.08	304	176	53,447	8.45
Preston	1,419,002	843,201	45,402	2,307,605	3.56	1,541	174	267,890	8.61
Putnam	----------	66,455	----------	66,455	4.48	75	179	13,452	4.94
Raleigh	6,321,786	175,458	21,227	6,518,471	6.12	4,456	163	724,840	8.99
Randolph	876,951	28,765	8,109	913,825	5.18	761	163	123,754	7.38
Taylor	46,237	24,696	4,374	75,307	3.64	102	128	13,051	5.77
Tucker	125,194	20,647	20	145,861	2.84	74	146	10,788	13.52
Upshur	1,043,617	39,549	9	1,083,175	4.40	469	174	81,401	13.31
Wayne	53,910	18,950	----------	72,860	3.84	106	95	10,077	7.23
Webster	425,686	4,782	431	430,899	5.74	457	102	46,606	9.25
Wyoming	10,664,025	192,196	29,898	10,886,119	5.88	4,583	212	971,002	11.21
Other counties	2,631,351	89,360	1,719,961	4,440,672	4.63	1,360	228	310,326	14.31
Total West Virginia	113,505,757	3,805,936	2,380,436	119,692,129	5.19	53,847	190	10,245,923	11.68

See footnotes at end of table.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties—Continued

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
WYOMING									
Campbell	352,832	27,303	46,474	426,609	$1.27	30	263	7,875	54.17
Carbon	94,463	2,575	1,269	98,307	3.18	30	233	6,989	14.07
Converse	----------	471,486	20	471,506	3.32	17	261	4,441	106.17
Fremont	----------	1,902	----------	1,902	6.01	4	285	1,139	1.67
Hot Springs	5,519	9,270	----------	14,789	8.36	18	161	2,905	5.09
Lincoln	311,049	----------	2,097	313,146	3.08	130	125	16,269	19.25
Sheridan	370,063	15,860	----------	385,923	3.36	59	259	15,284	25.25
Sweetwater	215,094	2,847	46,685	264,626	7.00	246	129	31,692	8.35
Total Wyoming	1,349,020	531,243	96,545	1,976,808	3.37	534	162	86,594	22.83
UNITED STATES									
Total United States	346,717,242	52,563,648	12,746,612	412,027,502	$4.77	179,636	188	33,712,306	12.22

[1] Includes coal loaded at mines directly into railroad cars or river barges, hauled by trucks to railroad sidings, and hauled by trucks to waterways.

[2] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

[3] Value received or charged for coal f.o.b. mines. Includes a value for coal not sold but used by producers, such as mine fuel and coal coked, as estimated by producers at average prices that might have been received if such coal had been sold commercially.

[4] In certain counties the average tons per man per day is large, owing to auger mining, strip mining, or mechanical loading underground.

[5] Included in "Other counties" to avoid disclosing individual operations.

Digitized by Google

TABLE 53.—Thermal drying of bituminous coal and lignite at mines in the United States, 1958–59, by States

State	Number of thermal drying units		Grand total production (net tons)		Net tons thermally dried		Percentage of total production thermally dried	
	1958	1959	1958	1959	1958	1959	1958	1959
Illinois	41	44	43,912,405	45,465,616	3,705,169	4,476,607	8.4	9.8
Indiana	28	30	15,022,224	14,803,501	2,607,665	2,289,895	17.4	15.5
Kentucky	15	13	66,311,805	62,809,849	2,533,529	2,257,854	3.8	3.6
Ohio	16	16	32,028,396	35,111,980	1,493,290	1,693,240	4.7	4.8
Pennsylvania	25	27	67,770,862	65,347,088	3,283,452	3,766,257	4.8	5.8
Utah	2	3	5,327,516	4,544,557	315,570	544,590	5.9	12.0
Virginia	12	19	26,826,067	29,768,840	2,617,446	4,100,214	9.8	13.8
Washington	3	3	252,269	242,318	107,226	72,000	42.5	29.7
West Virginia	86	92	119,467,697	119,692,129	14,878,778	16,564,079	12.5	13.8
Other States			33,526,306	34,241,624				
Total	228	247	410,445,547	412,027,502	31,542,125	35,764,736	7.7	8.7

PRODUCTION BY STATES AND COUNTIES

Detailed production and employment statistics are shown in table 54 for each coal-producing county in the United States from which three or more operators submitted reports for 1959. Statistics on counties with less than three reporting producers have been combined with data for "Other counties" to avoid disclosing individual figures, except when the Bureau has been granted permission to publish statistics separately. Production of mines on the border between two States has been credited to the State in which the coal was mined rather than to the State in which the tipple was located. If the coal was mined in both States, the tonnage was apportioned accordingly.

Bituminous coal and lignite were mined in 26 States and 331 counties in 1959. As soft coal is the source of a large part of the economic activity in many counties, the key items pertaining to the industry are published by counties and are useful in analyzing potential markets. These key items are (1) method of shipping the coal, (2) value, (3) number of men working daily, (4) days worked, and (5) tons per man per day.

The most striking fact shown by the following table is the wide variation among several counties in the same State, not only in production but also in average value and average tons per man per day. The differences in average value are due to quality of coal, method of transportation, or market conditions. The differences in output per man per day are caused largely by physical conditions, mining methods, and extent of mechanization.

Digitized by Google

TABLE 54.—Production, value, men working daily, days active, man-days, and output per man per day at bituminous coal and lignite mines in the United States, 1959, by States and counties

County	Production (net tons)				Average value per ton [3]	Average number of men working daily	Average number of days worked	Number of man-days worked	Average tons per man per day [4]
	Shipped by rail or water [1]	Shipped by truck	Used at mine [2]	Total					
ALABAMA									
Bibb	22,667	5,565	----------	28,232	$4.21	74	67	4,953	5.70
Blount	132,439	92,248	----------	224,687	5.82	102	208	21,228	10.58
Cullman	61,705	13,648	----------	75,353	5.35	59	177	10,457	7.21
Jackson	----------	14,901	----------	14,901	5.21	10	200	2,000	7.50
Jefferson	7,203,085	297,128	13,054	7,513,267	6.85	4,400	224	986,189	7.62
Marion	111,816	76,145	----------	187,961	6.64	218	189	41,227	4.56
Shelby	12,445	53,327	----------	65,772	6.53	114	197	22,448	2.93
Tuscaloosa	648,225	14,647	1,308	664,180	4.52	222	173	38,417	17.29
Walker	1,142,864	225,729	1,691,657	3,060,250	6.40	1,467	188	276,043	11.09
Winston	----------	----------	112,537	112,537	5.17	28	219	6,150	18.30
Total Alabama	9,335,246	793,338	1,818,556	11,947,140	6.55	6,694	211	1,409,112	8.48
ALASKA									
Total Alaska	652,829	3,724	3,347	659,900	$8.89	248	231	57,196	11.54
ARIZONA									
Coconino	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Navajo	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Total Arizona	----------	7,284	----------	7,284	$8.64	17	160	2,717	2.68
ARKANSAS									
Franklin	35,528	----------	----------	35,528	$6.60	10	151	1,510	23.53
Johnson	148,544	150	----------	148,694	8.07	122	114	13,889	10.71
Logan	9,302	426	----------	9,728	9.88	50	49	2,432	4.00
Pope	66,708	----------	----------	66,708	6.84	20	304	6,075	10.98
Sebastian	174,025	6,625	----------	180,650	8.27	293	133	38,938	4.64
Total Arkansas	434,107	7,201	----------	441,308	7.89	495	127	62,844	7.02
COLORADO									
Delta	39,631	28,949	968	69,548	$5.18	53	171	9,032	7.70
El Paso	----------	4,392	----------	4,392	7.51	3	145	435	10.10
Fremont	6,973	273,050	90	280,113	3.57	121	199	24,104	11.62
Garfield	----------	16,767	----------	16,767	6.19	25	134	3,353	5.00
Gunnison	198,668	54,717	9,546	262,931	5.73	196	170	33,367	7.88
Huerfano	16,749	42,995	----------	59,744	5.98	61	166	10,143	5.89
Jackson	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
La Plata	10,441	17,556	18	28,015	4.61	26	178	4,623	6.06
Las Animas	671,794	18,484	3,128	693,406	11.91	783	205	160,511	4.32
Mesa	----------	16,639	72,038	88,677	5.95	61	211	12,889	6.88
Moffat	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Montrose	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Pitkin	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
Rio Blanco	----------	10,840	----------	10,840	6.14	6	193	1,157	9.37
Routt	357,765	38,595	919	397,279	3.75	102	191	19,515	20.36
Weld	582,048	190,587	9,176	781,811	4.45	261	214	55,804	14.01
Other counties	533,453	67,146	20	600,619	6.19	236	184	43,455	13.82
Total Colorado	2,417,522	780,717	95,903	3,294,142	6.39	1,934	196	378,388	8.71

See footnotes at end of table.

Digitized by Google

TRANSPORTATION

Within recent years methods of shipping bituminous coal and lignite from the mines have changed radically; shipments by rail have declined, whereas shipments by water and truck have increased. Usually, shipments by water or truck (particularly for short distances) cost less than rail freight rates. See figure 13.

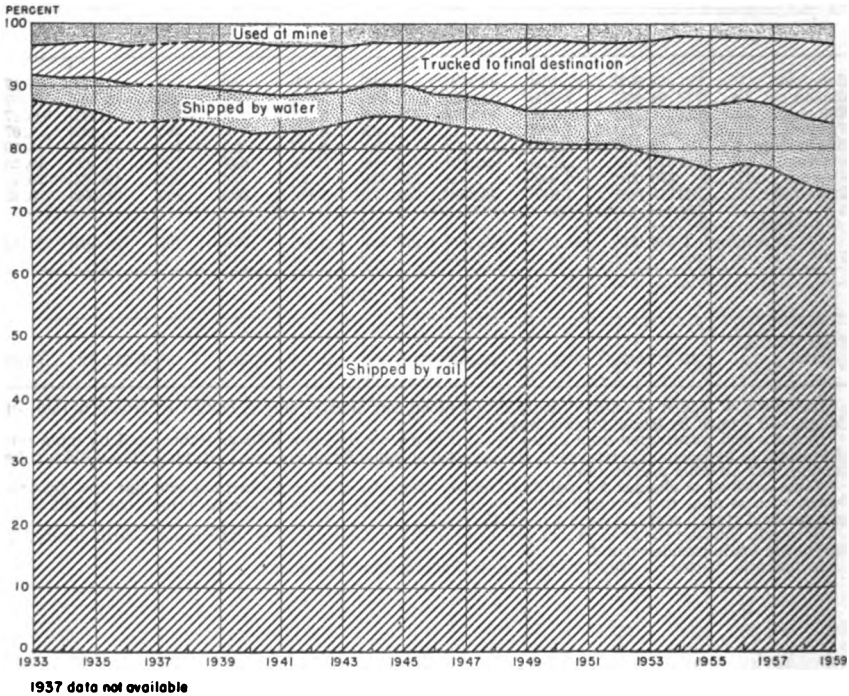

FIGURE 13.—Percentage of total production of bituminous coal and lignite, 1933–59, by method of shipment from mines, and percentage used at mines.

Digitized by Google

TABLE 55.—Bituminous coal and lignite shipped from mines, by method of shipment, and that used at mines in the United States, 1933–59

Year	Method of shipment from mines			Used at mines [1]	Total production
	Shipped by rail and trucked to rail	Shipped by water and trucked to water	Trucked to final destination		
	THOUSAND NET TONS				
1933	293,258	13,021	15,463	11,888	333,630
1934	313,204	15,128	18,739	12,197	359,368
1935	319,742	18,327	21,960	12,344	372,373
1936	370,763	24,868	27,929	15,528	439,088
1937	[2]	[2]	[2]	[2]	445,531
1938	295,336	16,903	25,592	10,714	348,545
1939	331,190	22,229	29,534	11,902	394,855
1940	380,388	29,493	35,540	15,350	460,771
1941	425,184	30,240	40,056	18,669	514,149
1942	482,814	34,018	45,154	20,707	582,693
1943	495,863	30,188	42,433	21,693	590,177
1944	527,136	31,518	40,123	20,799	619,576
1945	490,472	27,548	41,477	18,120	577,617
1946	450,615	24,642	42,731	15,934	533,922
1947	527,282	29,803	55,859	17,680	630,624
1948	498,194	26,735	58,260	16,329	599,518
1949	356,602	21,829	47,786	11,651	437,868
1950	417,225	27,583	58,286	13,217	516,311
1951	430,387	29,984	58,132	15,162	533,665
1952	375,911	27,746	50,231	12,953	466,841
1953	362,133	35,648	47,102	12,407	457,290
1954	305,918	32,912	44,689	8,187	391,706
1955	355,924	47,476	51,607	9,626	464,633
1956	390,015	50,732	49,768	10,359	500,874
1957	380,471	51,171	50,334	10,728	492,704
1958	305,642	43,899	50,605	10,300	410,446
1959	300,763	45,964	52,564	12,747	412,028
	PERCENTAGE OF TOTAL				
1933	87.9	3.9	4.6	3.6	100.0
1934	87.2	4.2	5.2	3.4	100.0
1935	85.9	4.9	5.9	3.3	100.0
1936	84.4	5.7	6.4	3.5	100.0
1937	[2]	[2]	[2]	[2]	100.0
1938	84.7	4.9	7.3	3.1	100.0
1939	83.9	5.6	7.5	3.0	100.0
1940	82.6	6.4	7.7	3.3	100.0
1941	82.7	5.9	7.8	3.6	100.0
1942	82.9	5.8	7.7	3.6	100.0
1943	84.0	5.1	7.2	3.7	100.0
1944	85.1	5.1	6.5	3.3	100.0
1945	84.9	4.8	7.2	3.1	100.0
1946	84.4	4.6	8.0	3.0	100.0
1947	83.6	4.7	8.9	2.8	100.0
1948	83.1	4.5	9.7	2.7	100.0
1949	81.4	5.0	10.9	2.7	100.0
1950	80.8	5.3	11.3	2.6	100.0
1951	80.7	5.6	10.9	2.8	100.0
1952	80.5	5.9	10.8	2.8	100.0
1953	79.2	7.8	10.3	2.7	100.0
1954	78.1	8.4	11.4	2.1	100.0
1955	76.6	10.2	11.1	2.1	100.0
1956	77.9	10.1	9.9	2.1	100.0
1957	77.2	10.4	10.2	2.2	100.0
1958	74.5	10.7	12.3	2.5	100.0
1959	73.0	11.1	12.8	3.1	100.0

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyors or trams, made into beehive coke at mines, and all other uses at mines.
[2] Data not available.

Digitized by Google

TABLE 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1959, as reported by mine operators

Route	State	Net tons	
		By State	Total for route
RAILROAD			
Alabama Central	Alabama	153,376	153,376
Alaska	Alaska	652,829	652,829
Atchison, Topeka & Santa Fe	Colorado	2,933	160,429
	Illinois	65,479	
	New Mexico	92,017	
Baltimore & Ohio	Illinois	265,142	31,753,182
	Indiana	652	
	Maryland	107,698	
	Ohio	2,162,879	
	Pennsylvania	5,337,273	
	West Virginia	23,879,538	
Bessemer & Lake Erie	Pennsylvania	1,457,470	1,457,470
Cambria & Indiana	do	1,776,045	1,776,045
Campbell's Creek	West Virginia	483,192	483,192
Carbon County	Utah	1,136,582	1,136,582
Central of Georgia	Alabama	32,073	32,073
Chesapeake & Ohio	Kentucky	8,357,077	43,212,035
	Ohio	111,050	
	West Virginia	34,743,908	
Cheswick & Harmar	Pennsylvania	494,415	494,415
Chicago, Burlington & Quincy	Illinois	6,913,704	8,326,823
	Iowa	248,126	
	Missouri	436,579	
	Wyoming	728,414	
Chicago & Eastern Illinois	Illinois	2,560,319	3,015,127
	Indiana	454,808	
Chicago & Illinois Midland	Illinois	3,563,061	3,563,061
Chicago, Milwaukee, St. Paul & Pacific	Indiana	1,681,942	1,939,697
	Montana (bituminous)	91,181	
	North Dakota (lignite)	166,574	
Chicago & North Western	Illinois	517,546	517,546
Chicago, Rock Island & Pacific	do	1,230,677	1,369,908
	Iowa	137,973	
	Oklahoma	1,258	
Clinchfield	Virginia	3,839,267	3,839,267
Colorado & Southern	Colorado	10,273	10,273
Colorado & Wyoming	do	668,321	668,321
Conemaugh & Black Lick	Pennsylvania	274,865	274,865
Denver & Rio Grande Western	Colorado	1,034,326	3,355,113
	New Mexico	5,260	
	Utah	2,315,527	
Detroit, Toledo & Ironton	Ohio	15,520	15,520
Erie	do	14,856	93,590
	Pennsylvania	78,734	
Great Northern	North Dakota (lignite)	487,301	487,301
Gulf, Mobile & Ohio	Alabama	212,589	1,033,467
	Illinois	820,878	
Illinois Central	do	8,368,531	21,920,294
	Indiana	39,807	
	Kentucky	13,511,956	
Illinois Terminal	Illinois	1,007,685	1,007,685
Interstate	Virginia	3,985,944	3,985,944
Johnstown & Stony Creek	Pennsylvania	80,414	80,414
Kansas City Southern	Oklahoma	364,589	364,589
Kentucky & Tennessee	Kentucky	361,426	361,426
Lake Erie, Franklin & Clarion	Pennsylvania	513,576	513,576
Louisville & Nashville	Alabama	2,462,138	25,488,799
	Kentucky	21,659,499	
	Tennessee	1,244,320	
	Virginia	122,842	
Mary Lee	Alabama	518,922	518,922
Midland Valley	Arkansas	72,262	332,555
	Oklahoma	260,293	
Minneapolis & St. Louis	Illinois	1,041,383	1,095,907
	Iowa	54,524	
Missouri-Illinois	Illinois	685,281	685,281
Missouri-Kansas-Texas	Kansas	396,336	1,650,136
	Missouri	896,706	
	Oklahoma	357,094	
Missouri Pacific	Arkansas	260,082	4,486,456
	Illinois	4,150,783	
	Kansas	544	
	Missouri	75,047	

Digitized by Google

TABLE 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1959, as reported by mine operators—Con.

Route	State	Net tons	
		By State	Total for route
RAILROAD—continued			
Monon	Indiana	335,097	335,097
Monongahela	Pennsylvania	950,232	6,248,522
	West Virginia	5,298,290	
Montour	Pennsylvania	1,404,514	1,404,514
New York Central (includes coal shipped over Kanawha & Michigan, Kelley's Creek, Toledo & Ohio Central, and Zanesville & Western).	Illinois	4,292,134	19,669,454
	Indiana	4,405,248	
	Ohio	3,207,899	
	Pennsylvania	4,540,735	
	West Virginia	3,223,438	
New York, Chicago & St. Louis	Ohio	5,263,987	5,263,987
Norfolk & Western	Kentucky	3,424,554	42,561,388
	Ohio	60,000	
	Virginia	16,239,854	
	West Virginia	22,836,980	
Northern Pacific	Montana (bituminous)	178,111	1,133,996
	North Dakota (lignite)	841,414	
	Washington	114,471	
Pacific Coast	----do	61,218	61,218
Peabody Short Line	Illinois	1,729,204	1,729,204
Pennsylvania	----do	2,748	22,187,420
	Indiana	3,008,409	
	Ohio	3,309,058	
	Pennsylvania	15,867,205	
Pittsburgh & Lake Erie	----do	579,692	579,692
Pittsburg & Shawmut	----do	1,215,521	1,215,521
Pittsburgh & West Virginia	Ohio	609,726	663,918
	Pennsylvania	27,317	
	West Virginia	26,875	
St. Louis-San Francisco	Alabama	906,530	1,877,348
	Arkansas	101,763	
	Kansas	271,991	
	Missouri	157,553	
	Oklahoma	439,511	
Soo Line	North Dakota (lignite)	287,694	287,694
Southern	Alabama	530,876	2,216,268
	Indiana	339,476	
	Kentucky	326,735	
	Tennessee	713,217	
	Virginia	305,964	
Southern Iowa	Iowa	6,753	6,753
Tennessee	Tennessee	389,041	389,041
Tennessee Central	----do	624,615	624,615
Tennessee Coal, Iron & Railroad Co	Alabama	2,064,024	2,064,024
Thomas & Sayreton	----do	154,045	154,045
Toledo, Peoria & Western	Illinois	537,215	537,215
Union Pacific	Colorado	701,669	1,322,275
	Wyoming	620,606	
Unity	Pennsylvania	259,530	259,530
Utah	Utah	648,349	648,349
Virginian	West Virginia	9,840,528	9,840,528
Wabash	Iowa	296,345	442,085
	Missouri	145,740	
Western Allegheny	Pennsylvania	172,598	172,598
Western Maryland	Maryland	253,968	3,517,579
	Pennsylvania	236,517	
	West Virginia	3,027,094	
Woodward Iron Company	Alabama	1,035,891	1,035,891
Total railroad shipments		300,763,260	300,763,260
WATERWAY			
Allegheny River	Pennsylvania	1,431,651	1,431,651
Black Warrior River	Alabama	1,062,346	1,062,346
Green River	Kentucky	5,428,742	5,428,742
Illinois River	Illinois	1,909,640	1,909,640
Inland Water Way	Alabama	202,436	202,436
Kanawha River	West Virginia	4,655,965	4,655,965
Kentucky River	Kentucky	55,676	55,676
Monongahela River	Pennsylvania	14,916,568	19,488,647
	West Virginia	4,572,079	

Digitized by Google

TABLE 56.—Bituminous coal and lignite loaded for shipment by railroads and waterways in the United States, 1959, as reported by mine operators—Con.

Route	State	Net tons	
		By State	Total for route
WATERWAY—continued			
Ohio River	Illinois	227,403	10,954,175
	Indiana	2,050,215	
	Kentucky	3,688,962	
	Ohio	4,069,725	
	West Virginia	917,870	
Tennessee River	Tennessee	686,973	686,973
Tradewater River	Kentucky	77,731	77,731
Total waterway shipments		45,953,982	45,953,982
Total loaded at mines for shipment by railroads and waterways		346,717,242	346,717,242
Shipped by truck from mine to final destination		52,563,648	52,563,648
Used at mine [1]		12,746,612	12,746,612
Total production, 1959		412,027,502	412,027,502

[1] Includes coal used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, transported from mines to point of use by conveyor, pipelines, or trams, made into beehive coke at mines, and all other uses at mines.

CONSUMPTION

The statistics on consumption of bituminous coal and lignite, by major consumer classes, are based upon complete coverage of all consumers in each class except "Other manufacturing and mining industries" and "Retail deliveries to other consumers." The figures for both categories are based upon a monthly sample approximating 35-percent coverage. A new benchmark representing complete coverage for "Other manufacturing and mining industries" was established for 1954, based upon data from the Census of Manufactures and the Census of Mineral Industries. The new benchmark for "Retail deliveries to other consumers" for 1954 represents the residual tonnage not otherwise accounted for and includes some coal shipped by truck from mine to final destination.

Data for each month are determined by matching plants reporting for the latest month with identical plants reporting the preceding month, calculating the percentage change from the previous month, and applying this percentage change to the published figure for the previous month. The results have been reasonably reliable over a period of years. A detailed analysis of the establishment of the new benchmarks and the revisions in "Cement mills," "Steel and rolling mills," and "Bunker, foreign and lake vessels," is given in Bureau of Mines Weekly Coal Report 2113, March 14, 1958. These revisions are applied to the figures in table 57 for 1933–59. The total of the classes approximates total consumption and is a much more reliable figure than "calculated" consumption based on production, imports, exports, and changes in stocks, because certain significant items of stocks are not included in yearend stocks. See figure 14.

Digitized by Google

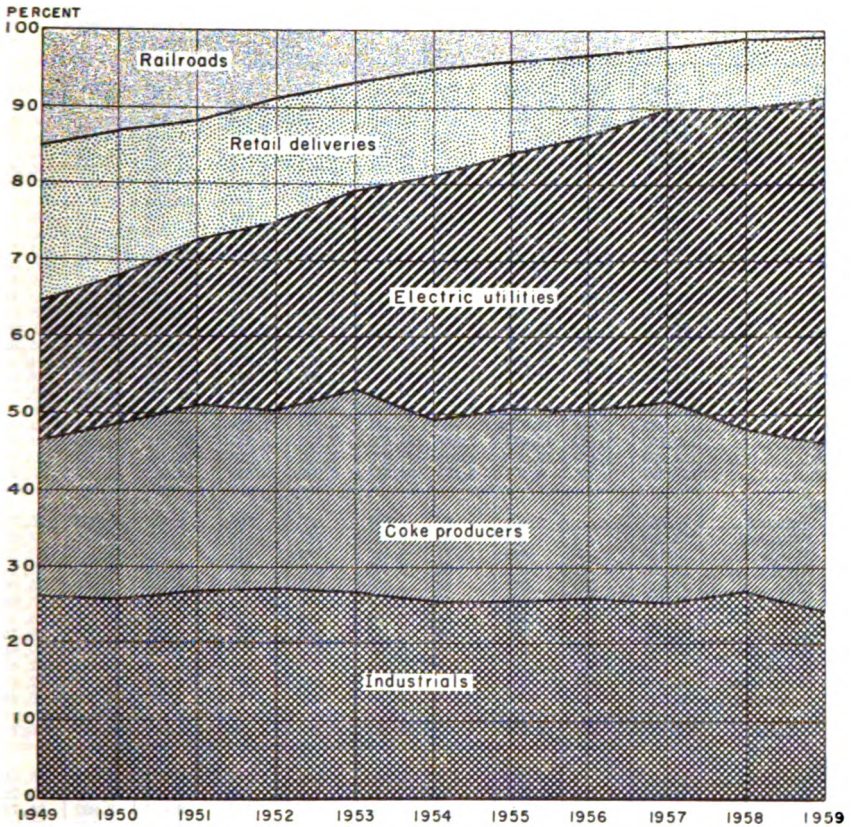

FIGURE 14.—Percentage of total consumption of bituminous coal and lignite, by consumer class, and retail deliveries in the United States, 1949–59.

Digitized by Google

TABLE 57.—Consumption of bituminous coal and lignite, by consumer class, with retail deliveries in the United States, 1933–59, in thousand net tons

Year and month	Electric power utilities [1]	Bunker, foreign and lake vessel [2]	Railroads (class I) [3]	Manufacturing and mining industries					Retail deliveries to other consumers [6]	Total of classes shown [7]
				Beehive coke plants	Oven coke plants	Steel and rolling mills [4]	Cement mills	Other manufacturing and mining industries [5]		
1933	27,088	2,298	72,548	1,408	38,681	14,129	2,760	81,377	77,396	317,685
1934	29,707	2,423	76,037	1,635	44,343	15,391	3,457	87,314	83,507	343,814
1935	30,936	2,683	77,109	1,469	49,046	16,585	3,456	94,598	80,444	356,326
1936	38,104	3,052	86,391	2,698	63,244	19,019	4,711	111,030	80,044	408,293
1937	41,045	3,433	88,080	4,927	69,575	18,148	5,182	124,056	76,331	430,777
1938	36,440	2,310	73,921	1,360	45,266	11,877	4,413	94,196	66,498	336,281
1939	42,304	2,764	79,072	2,298	61,216	13,843	5,194	100,637	68,770	376,098
1940	49,126	2,989	85,130	4,803	76,583	14,169	5,559	107,864	84,687	430,910
1941	59,888	3,304	97,384	10,529	82,609	15,384	6,735	121,880	94,402	492,115
1942	63,472	3,226	115,410	12,876	87,974	14,722	7,462	132,767	102,141	540,050
1943	74,036	3,042	130,283	12,441	90,019	15,864	5,842	142,149	120,121	593,797
1944	76,656	3,069	132,049	10,858	94,438	15,152	3,767	131,498	122,112	589,599
1945	71,603	3,192	125,120	8,135	87,214	14,241	4,203	126,562	119,297	559,567
1946	68,743	2,632	110,166	7,167	76,121	12,151	6,990	117,732	98,684	500,386
1947	86,009	3,087	109,296	10,475	94,325	14,195	7,919	123,928	96,657	545,891
1948	95,620	2,552	94,838	10,322	96,984	14,193	8,546	110,060	86,794	519,909
1949	80,610	2,056	68,123	5,354	85,882	10,529	7,966	96,629	88,389	445,538
1950	88,262	2,042	60,969	9,088	94,757	10,877	7,923	95,862	84,422	454,202
1951	101,898	2,220	54,005	11,418	102,030	11,260	8,507	103,188	74,378	468,904
1952	103,309	1,839	37,962	6,912	90,702	9,632	7,903	93,637	66,861	418,757
1953	112,283	1,839	27,735	8,226	104,648	8,764	8,167	95,160	59,976	426,798
1954	115,235	1,244	17,370	980	84,411	6,983	7,924	77,115	51,798	363,060
1955	140,550	1,499	15,473	2,869	104,508	7,353	8,529	89,611	53,020	423,412
1956	154,983	1,470	12,308	4,043	101,870	7,189	9,026	93,302	48,667	432,858
1957	157,398	1,364	8,401	3,473	104,547	6,938	8,633	87,202	35,712	413,668
1958:										
January	14,563	--------	521	86	6,691	800	706	8,407	5,006	36,780
February	13,352	3	452	66	5,753	787	615	7,592	5,031	33,651
March	13,165	3	400	71	6,126	734	626	7,562	3,627	32,314
April	11,290	41	320	60	5,443	583	629	6,556	2,198	27,120
May	11,012	106	276	66	5,553	559	700	6,150	1,567	25,989
June	11,183	124	227	79	5,573	486	718	5,806	1,451	25,647
July	11,821	121	191	54	5,635	438	729	5,829	1,454	26,272
August	12,381	141	197	69	6,112	466	673	6,097	2,063	28,199
September	12,087	137	215	95	6,344	472	683	6,609	2,826	29,468
October	13,094	137	281	109	7,201	538	735	6,931	3,428	32,454
November	13,265	111	282	123	7,386	575	682	6,833	3,068	32,325
December	15,715	31	363	139	7,746	830	760	7,000	3,900	36,484
Total	152,928	955	3,725	1,017	75,563	7,268	8,256	81,372	35,619	366,703
1959:										
January	15,907	1	339	139	7,865	808	645	6,937	4,044	36,685
February	14,002	3	304	154	7,720	768	591	6,160	3,551	33,253
March	14,400	4	286	235	8,860	756	717	6,697	2,802	34,757
April	12,632	66	241	267	8,611	645	693	6,148	1,634	30,937
May	12,718	154	189	223	8,830	567	757	5,798	1,018	30,254
June	13,249	158	152	202	8,361	548	732	5,462	1,059	29,923
July	13,391	126	133	119	4,931	343	722	5,118	1,248	26,131
August	13,806	105	131	88	2,530	282	725	5,302	1,622	24,591
September	12,987	89	137	67	2,458	261	712	5,382	2,281	24,374
October	13,389	108	186	67	2,535	258	685	6,135	2,881	26,244
November	14,084	120	236	112	6,100	620	753	6,841	3,267	32,133
December	15,223	35	266	154	8,553	818	778	7,416	3,731	36,974
Total	165,788	969	2,600	1,827	77,354	6,674	8,510	73,396	29,138	366,256

[1] Federal Power Commission.
[2] Bureau of the Census, U.S. Department of Commerce. Ore and Coal Exchange.
[3] Association of American Railroads. Represents consumption of bituminous coal and lignite for all uses, including locomotive, powerhouse, shop, and station fuel.
[4] Estimates based upon reports collected from a selected list of representative steel and rolling mills.
[5] Estimates based upon reports collected from a selected list of representative manufacturing plants.
[6] Estimates based upon reports collected from a selected list of representative retailers. Includes some coal shipped by truck from mine to final destination.
[7] The total of classes shown approximates total consumption. The calculation of consumption from production, imports, exports, and changes in stocks is not as accurate as the "Total of classes shown" because certain significant items of stocks are not included in yearend stocks. These items are: Stocks on lake and tidewater docks, stocks at other intermediate storage piles between mine and consumer, and coal in transit.

Digitized by Google

TABLE 58.—Fuel economy in consumption of coal at electric-utility powerplants in the United States, 1919–59

Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100	Year	Coal consumed per kilowatt-hour (pounds)	Index numbers based on 1919 as 100
1919	3.20	100.0	1933	1.46	45.6	1947	1.31	40.9
1920	3.00	93.8	1934	1.45	45.3	1948	1.30	40.6
1921	2.70	84.4	1935	1.44	45.0	1949	1.24	38.8
1922	2.50	78.1	1936	1.44	45.0	1950	1.19	37.2
1923	2.40	75.0	1937	1.44	45.0	1951	1.14	35.6
1924	2.20	68.8	1938	1.40	43.8	1952	1.10	34.4
1925	2.00	62.5	1939	1.38	43.1	1953	1.06	33.1
1926	1.90	59.4	1940	1.34	41.9	1954	.99	30.9
1927	1.82	56.9	1941	1.34	41.9	1955	.95	29.7
1928	1.73	54.1	1942	1.30	40.6	1956	.94	29.4
1929	1.66	51.9	1943	1.30	40.6	1957	.93	29.1
1930	1.60	50.0	1944	1.29	40.3	1958	.90	28.1
1931	1.52	47.5	1945	1.30	40.6	1959	.89	27.8
1932	1.49	46.6	1946	1.29	40.3			

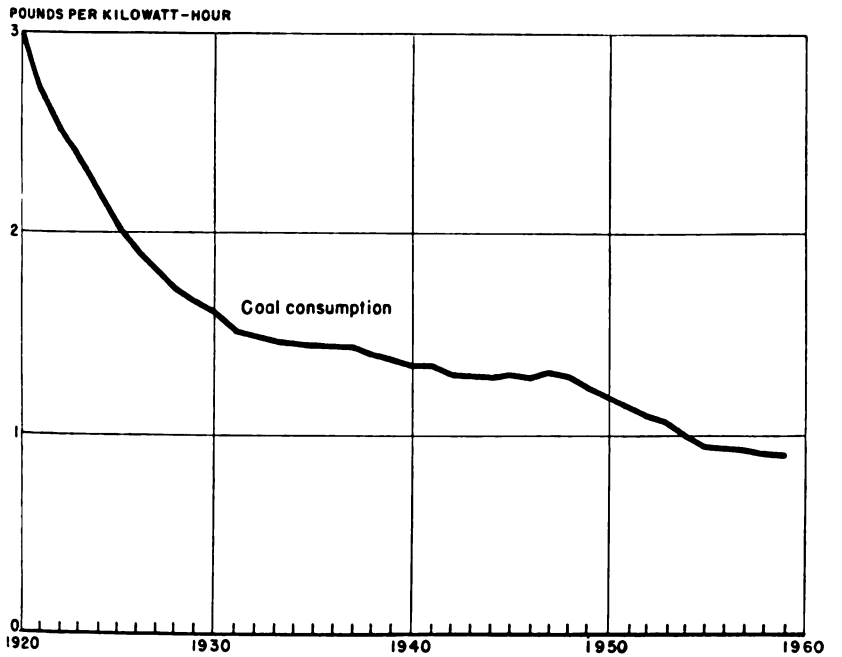

FIGURE 15.—Trend in fuel economy at electric-utility powerplants in the United States, 1920–59.

Digitized by Google

RELATIVE RATE OF GROWTH OF MINERAL FUELS AND WATERPOWER

Information on the trends in consumption of the various energy fuels and waterpower is presented in the Review of Mineral-Fuel Industries, Minerals Yearbook, volume II, 1959.

STOCKS

The figures on stocks are based on complete coverage for all categories except "Other manufacturing and mining industries" and "Retail dealer stocks." Stocks for these two categories are based on samples, and the statistical procedure followed is that for calculating total consumption.

TABLE 59.—Stocks of bituminous coal and lignite in the hands of commercial consumers and in retail dealers' yards in the United States, 1958–59

Date	Total stocks (net tons)	Days' supply at current rate of consumption on date of stock taking							
				Manufacturing and mining industries					
		Electric power utilities	Railroads (class I)	Oven coke plans	Steel and rolling mills	Cement mills	Other manufacturing and mining industries	Retail dealers	Total
1958									
Jan. 31	77,355,000	104	39	61	23	60	45	5	65
Feb. 28	72,264,000	97	38	59	21	56	41	3	60
Mar. 31	70,922,000	106	46	60	25	56	46	4	68
Apr. 30	71,296,000	121	52	65	32	51	51	7	79
May 31	72,613,000	133	57	65	34	48	55	13	87
June 30	74,646,000	131	65	63	42	48	57	18	87
July 31	71,144,000	124	67	55	38	46	58	20	84
Aug. 31	72,256,000	120	63	51	37	52	56	15	79
Sept. 30	74,020,000	123	56	50	39	53	49	11	75
Oct. 31	77,807,000	120	45	50	35	56	54	10	74
Nov. 30	77,212,000	114	41	50	37	63	48	11	72
Dec. 31	76,285,000	96	29	52	29	61	49	8	66
1959									
Jan. 31	71,203,000	88	33	48	26	64	48	6	60
Feb. 28	69,167,000	86	32	43	24	57	52	5	58
Mar. 31	65,868,000	90	37	41	25	45	45	6	59
Apr. 30	65,739,000	100	34	40	28	45	46	9	64
May 31	67,659,000	106	44	42	34	45	51	19	69
June 30	70,369,000	102	53	45	40	49	55	23	71
July 31	65,374,000	101	58	58	66	50	58	23	78
Aug. 31	66,596,000	102	58	103	73	53	56	20	84
Sept. 30	68,732,000	110	54	97	74	55	55	14	85
Oct. 31	72,663,000	115	41	115	67	64	52	12	86
Nov. 30	74,653,000	108	30	50	26	57	47	10	70
Dec. 31	76,202,000	102	26	42	25	57	47	9	64

Digitized by Google

PRICES

TABLE 60.—Average value per ton, f.o.b. mines, of bituminous coal and lignite produced in the United States, 1958–59, by States

State	1958				1959			
	Underground mines	Strip mines	Auger mines	Total, all mines	Underground mines	Strip mines	Auger mines	Total, all mines
Alabama	$6.87	$5.17	$8.53	$6.47	$6.98	$5.03	$8.74	$6.55
Alaska	8.72	9.28	-------	9.13	8.58	8.96	-------	8.89
Arizona	7.03	-------	-------	7.03	8.64	-------	-------	8.64
Arkansas	8.22	7.34	-------	7.53	8.55	7.43	-------	7.89
Colorado	6.97	3.60	-------	6.49	5.34	3.34	-------	6.39
Georgia	5.00	-------	-------	5.00	5.00	-------	-------	5.00
Illinois	4.09	3.94	3.96	4.02	4.10	4.01	3.82	4.06
Indiana	4.20	3.76	-------	3.89	4.34	3.92	-------	4.05
Iowa	4.13	3.35	-------	3.52	4.21	3.42	-------	3.57
Kansas	6.08	4.49	-------	4.51	6.52	4.66	-------	4.67
Kentucky	4.81	3.33	3.51	4.36	4.78	3.33	3.55	4.30
Maryland	4.69	3.13	-------	3.77	4.67	3.30	-------	3.78
Missouri	4.94	4.26	-------	4.29	4.94	4.32	-------	4.34
Montana:								
Bituminous	6.30	3.44	-------	5.94	7.11	6.34	-------	7.06
Lignite	4.27	1.95	-------	2.34	4.36	1.92	-------	2.08
Total Montana	6.14	2.33	-------	4.84	6.87	2.13	-------	4.28
New Mexico	6.52	4.17	-------	6.15	6.04	4.17	-------	5.64
North Dakota (lignite)	4.73	2.33	-------	2.34	4.72	2.25	-------	2.25
Ohio	4.68	3.64	3.65	3.94	4.56	3.61	3.43	3.86
Oklahoma	8.85	6.02	-------	6.66	8.93	6.09	-------	6.74
Pennsylvania	6.21	3.86	3.12	5.52	6.01	3.73	3.19	5.28
South Dakota (lignite)	-------	4.00	-------	4.00	-------	4.01	-------	4.01
Tennessee	3.99	3.67	2.99	3.83	3.99	4.07	3.66	3.99
Utah	5.70	-------	-------	5.70	6.16	-------	-------	6.16
Virginia	4.98	3.74	3.15	4.86	4.76	3.65	3.97	4.68
Washington	7.81	7.30	-------	7.80	7.46	9.32	-------	7.60
West Virginia	5.46	4.02	3.83	5.32	5.31	3.74	4.11	5.19
Wyoming	6.53	2.72	-------	3.57	6.91	2.66	-------	3.37
Total	5.33	3.80	3.60	4.86	5.23	3.76	3.83	4.77

Digitized by Google

TABLE 61.—Production and average value per ton, f.o.b. mines, of bituminous coal and lignite sold in open market and not sold in open market, 1959, by States

State	Production					Average value per ton, f.o.b. mines		
	Sold in open market		Not sold in open market		Total (net tons)	Sold in open market	Not sold in open market	Total
	Net tons	Percentage of total	Net tons	Percentage of total				
Alabama	5,256,030	44.0	6,691,110	56.0	11,947,140	$5.16	$7.64	$6.55
Alaska	658,402	99.8	1,498	.2	659,900	8.90	7.12	8.89
Arizona	2,961	40.7	4,323	59.3	7,284	5.92	10.50	8.64
Arkansas	441,158	100.0	150		441,308	7.89	8.50	7.89
Colorado	2,622,760	79.6	671,382	20.4	3,294,142	4.92	12.11	6.39
Georgia	6,767	100.0			6,767	5.00		5.00
Illinois	45,457,679	100.0	7,937		45,465,616	4.06	5.20	4.06
Indiana	14,594,971	98.6	208,530	1.4	14,803,501	4.05	3.88	4.05
Iowa	1,179,900	100.0			1,179,900	3.57		3.57
Kansas	771,991	100.0	63		772,054	4.67	4.65	4.67
Kentucky	56,186,834	89.5	6,623,015	10.5	62,809,849	4.07	6.22	4.30
Maryland	842,427	100.0			842,427	3.78		3.78
Missouri	2,739,645	99.7	8,038	.3	2,747,683	4.34	5.68	4.34
Montana:								
Bituminous	151,711	99.6	653	.4	152,364	7.06	7.00	7.06
Lignite	192,791	100.0			192,791	2.08		2.08
Total Montana	344,502	99.8	653	.2	345,155	4.28	7.00	4.28
New Mexico	92,479	62.3	56,071	37.7	148,550	5.42	6.00	5.64
North Dakota (lignite)	2,364,361	98.0	48,257	2.0	2,412,618	2.27	1.45	2.25
Ohio	31,144,615	88.7	3,967,365	11.3	35,111,980	3.98	3.00	3.86
Oklahoma	1,237,993	81.2	287,046	18.8	1,525,039	6.15	9.25	6.74
Pennsylvania	41,176,005	63.0	24,171,083	37.0	65,347,088	4.52	6.58	5.28
South Dakota (lignite)	22,125	100.0			22,125	4.01		4.01
Tennessee	5,805,225	98.2	107,499	1.8	5,912,724	4.01	2.63	3.99
Utah	2,353,215	51.8	2,191,342	48.2	4,544,557	5.39	6.99	6.16
Virginia	29,519,930	99.2	248,910	.8	29,768,840	4.67	5.58	4.68
Washington	235,566	97.2	6,752	2.8	242,318	7.55	9.20	7.60
West Virginia	105,098,962	87.8	14,593,167	12.2	119,692,129	5.01	6.49	5.19
Wyoming	854,365	43.2	1,122,443	56.8	1,976,808	3.65	3.16	3.37
Total	351,010,868	85.2	61,016,634	14.8	412,027,502	4.49	6.40	4.77

Digitized by Google

LIGNITE

TABLE 62.—Summary of operations at lignite mines in the United States, 1959, by States [1]

Item	Montana	North Dakota	South Dakota	Total
UNDERGROUND MINES				
Number of mines	3	1		4
Shot from solid—net tons	10,929	3,251		14,180
Cut by machines—do	2,398			2,398
Total production—do	13,327	3,251		16,578
Number of cutting machines	2			2
Average output per machine—net tons	1,199			1,199
Underground production cut by machine—percent	18.0			18.0
Average value per ton	$4.36	$4.72		$4.43
Average number of men working daily	15	5		20
Average number of days worked	153	152		153
Number of man-days worked	2,295	761		3,056
Average tons per man per day	5.81	4.27		5.42
STRIP MINES				
Number of strip mines	4	34	1	39
Production—net tons	179,464	2,409,367	22,125	2,610,956
Average value per ton	$1.92	$2.25	$4.01	$2.24
Number of shovels and draglines	3	59	2	64
Average number of men working daily	21	318	9	348
Average number of days worked	225	209	252	211
Number of man-days worked	4,735	66,451	2,269	73,455
Average tons per man per day	37.90	36.26	9.75	35.54
TOTAL, ALL LIGNITE MINES				
Number of mines	7	35	1	43
Production (net tons):				
Shipped by rail [2]	175,574	1,782,983		1,958,557
Shipped by truck	17,163	381,107	21,825	420,095
Used at mines [3]	54	248,528	300	248,882
Total	192,791	2,412,618	22,125	2,627,534
Average value per ton	$2.08	$2.25	$4.01	$2.25
Average number of men working daily	36	323	9	368
Average number of days worked	195	208	252	208
Number of man-days worked	7,030	67,212	2,269	76,511
Average tons per man per day	27.42	35.90	9.75	34.34

[1] Exclusive of Texas (lignite).
[2] Includes coal loaded at mines directly into railroad cars and hauled by trucks to railroad sidings.
[3] Includes coal transported from mines to point of use by conveyor belts or trams, used by mine employees, taken by locomotive tenders at tipples, used at mines for power and heat, made into beehive coke at mines, and all other uses at mines.

Digitized by Google

FOREIGN TRADE[5]

Imports of bituminous coal and lignite are very small. Exports have been an important item of foreign trade for many years, particularly since the close of World War II. See figure 16.

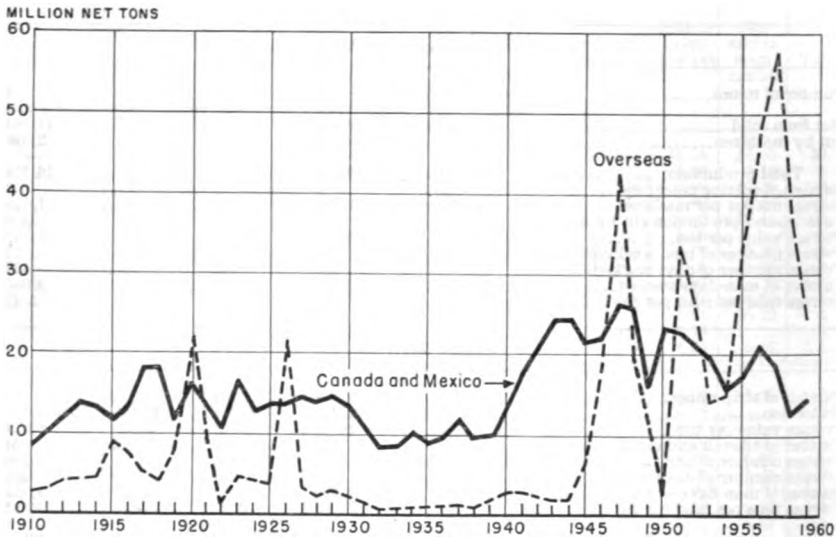

FIGURE 16.—Exports of bituminous coal and lignite from the United States to Canada and Mexico and overseas, 1910–59.

TABLE 63.—Bituminous coal[1] imported for consumption in the United States 1957–59, by countries and customs districts, in net tons

[Bureau of the Census]

Country and customs district	1957	1958	1959
Country:			
North America: Canada	366,506	306,940	374,713
Europe: Germany, West		(2)	
Total	366,506	306,940	374,713
Customs district:			
Alaska	202	140	30
Chicago		(2)	
Dakota		45	
Duluth and Superior		67	
Maine and New Hampshire	217,376	190,290	114,095
Michigan			64
Montana and Idaho	137,418	98,359	71,767
New York	1,648		
Vermont		146	306
Washington	9,862	17,893	188,451
Total	366,506	306,940	374,713

[1] Includes slack, culm, and lignite.
[2] Less than 1 ton.

[5] Figures on imports and exports compiled by M. B. Price and E. D. Page, of the Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.

Digitized by Google

TABLE 64.—Exports of bituminous coal, by country groups, 1950–54 (average) and 1955–59, in thousand net tons

[Bureau of the Census]

Year	Canada and Mexico	Overseas (all other countries)								
		West Indies and Central America [1]	Miquelon, Bermuda, and Greenland	South America	Europe	Asia	Africa	Oceania	Total overseas	Grand total
1950–54 (average)	20,481	87	5	1,946	13,635	2,411	354	8	18,446	38,927
1955	17,232	51	6	1,447	28,677	3,726	138	-------	34,045	51,277
1956	20,705	40	2	2,828	41,156	3,509	313	-------	47,848	68,553
1957	18,493	35	4	2,269	49,701	5,673	271	-------	57,953	76,446
1958	[2] 12,272	34	1	1,452	[2] 32,889	3,550	95	-------	[2] 38,021	[2] 50,293
1959	12,452	17	(3)	1,499	19,109	4,077	73	-------	24,775	37,227

[1] Includes Bahamas and Panama.
[2] Revised figure.
[3] Less than 1,000 tons.

TABLE 65.—Bituminous coal exported from the United States, 1956–59, by countries, in net tons [1]

[Bureau of the Census]

Country	1956	1957	1958	1959
North America:				
Bermuda	2,350	1,134	1,211	-------
Canada	20,654,885	18,444,949	[2] 12,238,179	12,399,940
Central America:				
Costa Rica	125	-------	120	20
El Salvador	245	120	45	45
Guatemala	1,032	360	160	120
Honduras	50	140	65	170
Other Central America	-------	25	25	25
Greenland	-------	2,264	-------	-------
Mexico	50,059	47,913	33,997	51,512
Miquelon	-------	-------	-------	643
West Indies:				
British:				
Barbados	-------	-------	537	-------
Jamaica	5,468	51	888	-------
Trinidad and Tobago	1,975	2,237	653	2,549
Cuba	27,863	30,905	29,404	12,758
Dominican Republic	548	230	218	226
French	2,249	1,259	988	521
Haiti	-------	-------	-------	150
Netherlands Antilles	-------	-------	-------	100
Total North America	20,746,849	18,531,587	[2] 12,306,490	12,468,779
South America:				
Argentina	1,518,775	914,006	216,186	397,786
Bolivia	14,454	1,203	-------	-------
Brazil	969,383	1,059,802	977,988	880,970
Chile	222,819	194,333	192,694	162,312
Peru	-------	3,390	44	-------
Uruguay	101,634	95,564	65,143	58,253
Other South America	116	127	274	28
Total South America	2,827,181	2,268,425	1,452,329	1,499,349

See footnotes at end of table.

Digitized by Google

TABLE. 65.—Bituminous coal exported from the United States, 1956–59, by countries in net tons [1]—Continued

[Bureau of the Census]

Country	1956	1957	1958	1959
Europe:				
Austria	1,353,150	926,780	1,083,078	809,985
Azores		2,390		
Belgium-Luxembourg	1,858,989	2,146,214	2,280,116	1,150,373
Denmark	363,954	355,551	495,360	189,309
Finland	421,773	242,266	102,960	5,553
France	6,589,043	7,116,005	3,000,913	1,022,498
Germany, West	10,243,077	15,569,712	9,708,332	4,463,301
Gibraltar	23,663	22,305	7,158	
Greece	127,613	212,043	74,129	20,763
Hungary		167,819		
Iceland	7,180	8,447		
Ireland			516,970	417,365
Italy	7,556,640	8,761,669	6,989,027	5,200,296
Netherlands	6,593,850	8,062,538	5,515,399	3,288,234
Norway	392,258	367,525	214,799	110,969
Poland and Danzig		85,388	52,223	
Portugal	204,153	303,744	[2] 232,653	147,512
Spain	358,707	757,629	733,492	747,165
Sweden	903,947	1,282,666	788,379	749,546
Switzerland	266,989	402,483	421,038	262,668
Trieste	501,088	648,835	263,872	88,065
United Kingdom	2,754,117	1,748,879	20,156	24,499
Yugoslavia	636,302	510,234	389,222	410,619
Total Europe	41,156,493	49,701,122	[2] 32,889,276	19,108,720
Asia:				
Indonesia	47,695	44,170	24,479	48,973
Israel	2,259	1,903	553	279
Japan	3,178,329	4,872,589	3,299,133	4,020,258
Korea, Republic of	280,257	754,645	225,877	7,318
Other Asia	350	32	37	12
Total Asia	3,508,890	5,673,339	3,550,079	4,076,870
Africa:				
Algeria	58,097	138,928		
Angola	128,763	26,125	11,506	
Canary Islands	8,375	12,382	9,192	2,799
Madeira Islands	4,149	1,350		
Morocco	[2] 22,316	11,496		
Libya	14,416	32,159	32,590	44,644
Tunisia	11,340	13,806		
United Arab Republic (Egypt region) [4]	49,454	34,810	24,470	25,605
Other Africa	16,306		17,450	
Total Africa	313,216	271,056	95,208	73,048
Grand total	68,552,629	76,445,529	[2] 50,293,382	37,226,766

[1] Amounts stated do not include fuel or bunker coal loaded on vessels engaged in foreign trade, which aggregated 498,967 tons in 1956, 419,360 tons in 1957, 358,519 tons in 1958, and 365,806 tons in 1959.
[2] Revised figure.
[3] French Morocco.
[4] Effective July 1, 1958.

Digitized by Google

TABLE 66.—Bituminous coal exported from the United States, 1956–59, by customs districts, in net tons

[Bureau of the Census]

Customs district	1956	1957	1958	1959
North Atlantic:				
Connecticut		61		
Maine and New Hampshire	1,383	12,165	1,893	5,933
Massachusetts	2,274	7,341	58	9,812
New York	1,675	3,282	656	9,835
Philadelphia	464,432	617,457	342,737	80,818
Rhode Island		3,121		
South Atlantic:				
Georgia				102
Maryland	4,789,671	4,913,765	3,452,683	1,586,620
North Carolina		46		
Virginia	42,158,581	51,212,392	33,875,389	23,011,770
Gulf Coast:				
Florida		99		63
Galveston	77	66	278	559
Mobile	241,002	123,399	118,156	101,671
New Orleans	155	11,761	6,176	315
Mexican border:				
Arizona	88	49	114	
El Paso	2,038	4,556	24,632	51,005
Laredo	180	142	160	266
Pacific Coast:				
Los Angeles		45,403		
Oregon		555,524	27,232	
San Diego		66		2
San Francisco		143,427	191,558	
Washington	426	99,832	33,160	1,231
Northern border:				
Buffalo	346,235	286,697	306,146	344,102
Chicago	1,081,059	717,255	157,384	112,298
Dakota	16,866	30,820	45,090	17,802
Duluth and Superior	171,942	66,187	70,489	21,420
Indiana			3,723	
Michigan	1,152,505	1,141,216	831,930	566,843
Minnesota			701	223
Montana and Idaho	286	158	164	219
Ohio	11,871,058	11,984,090	8,652,892	9,417,634
Rochester	2,773,170	2,905,362	[1] 1,583,879	1,300,531
St. Lawrence	738,873	1,178,122	507,390	548,412
Vermont			43	115
Wisconsin			49	
Miscellaneous:				
Kentucky				54
Pittsburgh				16,661
Total [2]	68,552,629	76,445,529	[1] 50,293,382	37,226,766

[1] Revised figure.
[2] Includes 2,738,653 tons in 1956, 381,668 tons in 1957, 58,630 tons in 1958, and 20,360 tons in 1959, representing estimated data for which district breakdown is not available.

TABLE 67.—Shipments of bituminous coal to possessions and other areas administered by the United States, 1957–59, in net tons

[Bureau of the Census]

Territory	1957	1958	1959
Guam	4		1
Puerto Rico	4,555	1,209	1,051
Virgin Islands		1	

Digitized by Google

WORLD PRODUCTION

The United States supplied 433 million tons of bituminous coal, anthracite, and lignite, or 16 percent of the world output, in 1959.

Production increased slightly in most coal-producing countries of Europe in 1959; however, consumption requirements of the principal coal-producing countries on the European Continent exceeded available supplies. Production from the United States offset a large part of the deficit.

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1955–59, in thousand short tons [1]

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country	1955	1956	1957	1958	1959 [2]
North America:					
Canada:					
Bituminous	12,525	12,574	10,940	9,434	8,680
Lignite	2,294	2,342	2,249	2,253	1,948
Greenland: Bituminous	18	18	19	35	32
Mexico: Bituminous	1,479	1,552	1,566	1,621	1,748
United States:					
Anthracite (Pennsylvania)	26,205	28,900	25,338	21,171	20,649
Bituminous	461,468	497,997	490,097	408,019	409,248
Lignite	3,166	2,878	2,607	2,427	2,780
Total	507,155	546,261	532,816	444,960	445,085
South America:					
Argentina: Bituminous	150	169	230	291	287
Brazil: Bituminous (including lignite)	2,500	2,463	2,285	2,469	2,342
Chile: Bituminous (mined)	2,544	2,511	2,310	2,204	[3] 2,095
Colombia: Bituminous	1,984	2,094	[3] 2,480	2,425	2,756
Peru: Bituminous and anthracite	150	160	155	246	188
Venezuela: Bituminous	33	34	39	40	37
Total	7,361	7,431	7,499	7,675	7,705
Europe:					
Albania: Lignite	220	247	259	282	[3] 285
Austria:					
Bituminous	188	183	168	155	148
Lignite	7,296	7,419	7,581	7,158	6,857
Belgium: Bituminous and anthracite	32,981	32,475	32,062	29,831	25,085
Bulgaria:					
Anthracite	132	137	[3] 150	[3] 165	[3] 165
Lignite (including bituminous)	10,947	11,787	12,957	13,867	16,745
Czechoslovakia:					
Bituminous	24,401	25,806	26,655	28,453	29,217
Lignite	44,920	51,036	56,235	62,653	59,196
Denmark: Lignite	839	1,534	2,822	2,695	2,540
France:					
Bituminous and anthracite	60,997	60,773	62,610	63,626	63,500
Lignite	2,263	2,484	2,528	2,555	2,398
Germany:					
Bituminous and anthracite:					
East	2,956	3,024	3,035	3,201	3,132
West	145,250	149,427	148,068	147,183	139,329
Lignite:					
East	221,137	226,928	234,346	236,962	236,776
West	99,579	104,976	106,716	103,052	102,991
Pech coal: West	2,003	1,979	2,048	2,013	2,022
Greece: Lignite	862	880	1,100	1,315	1,653
Hungary:					
Bituminous	2,967	2,619	2,510	2,895	3,014
Lignite	21,632	20,080	20,856	23,826	24,927
Ireland: Bituminous and anthracite	222	265	266	265	257
Italy:					
Bituminous and anthracite	1,251	1,188	1,129	798	815
Lignite	462	445	434	898	1,346
Netherlands:					
Bituminous and anthracite	13,112	13,047	12,540	13,095	13,203
Lignite	281	298	317	281	219

See footnotes at end of table.

Digitized by Google

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1955–59, in thousand short tons [1]—Continued

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country	1955	1956	1957	1958	1959 [2]
Europe—Continued					
Poland:					
Bituminous	104,142	104,884	103,723	104,699	109,246
Lignite	6,663	6,816	6,563	8,313	10,205
Portugal:					
Bituminous and anthracite	445	456	550	625	581
Lignite	97	161	203	172	175
Rumania:					
Bituminous and anthracite	212	211	277	331	311
Lignite	6,518	6,924	7,500	7,813	8,466
Saar: Bituminous	19,102	18,838	18,139	18,103	17,908
Spain:					
Bituminous and anthracite	13,696	14,165	15,356	15,922	14,926
Lignite	2,024	2,125	2,777	2,945	2,317
Svalbard (Spitsbergen): Bituminous:					
Controlled by Norway	355	430	423	322	301
Controlled by U.S.S.R.	342	386	434	[3] 440	[3] 440
Sweden: Bituminous	311	324	335	352	300
Switzerland: Bituminous and anthracite (incl. lignite) [3]	11	11	11	11	11
U.S.S.R.: [4]					
Bituminous and anthracite	304,915	335,104	362,111	389,104	397,383
Lignite	126,373	137,978	148,777	157,408	160,937
United Kingdom: Bituminous and anthracite	248,223	248,646	250,464	241,723	230,895
Yugoslavia:					
Bituminous	1,250	1,358	1,353	1,332	1,431
Lignite	15,510	17,493	18,497	19,597	21,836
Total [4]	1,547,087	1,615,347	1,674,885	1,716,436	1,713,489
Asia:					
Afghanistan: Bituminous	25	26	30	37	40
China: Bituminous, anthracite, and lignite	102,700	116,700	144,100	297,600	[3] 383,400
India: Bituminous	42,813	43,994	48,491	50,777	52,668
Indonesia: Bituminous	897	913	790	668	703
Iran: Bituminous [3]	270	209	194	214	[3] 210
Japan:					
Bituminous and anthracite	46,763	51,318	57,025	54,756	52,093
Lignite	1,508	1,676	1,832	1,744	1,619
Korea:					
North: Anthracite and lignite [3]	3,500	4,500	5,500	7,600	8,300
Republic of: Anthracite	1,442	2,001	2,691	2,944	4,559
Malaya: Bituminous	230	204	171	75	85
Outer Mongolia: Lignite and bituminous [3]	220	330	440	550	665
Pakistan: Bituminous and lignite	592	722	578	669	820
Philippines: Bituminous	143	168	211	119	154
Taiwan: Bituminous	2,600	2,788	3,214	3,508	3,928
Thailand: Lignite	44	96	110	138	121
Turkey (mined):					
Bituminous	6,058	6,490	6,917	7,234	7,191
Lignite	2,663	3,318	4,009	4,212	4,038
Vietnam:					
North: Anthracite	1,213	1,340	1,200	1,650	[3] 2,200
South: Anthracite		2	13	22	22
Total [4]	213,681	236,795	277,516	434,517	522,816
Africa:					
Algeria: Bituminous and anthracite	333	327	260	169	134
Belgian Congo: Bituminous	529	463	477	324	294
Madagascar: Bituminous			1		
Morocco: Southern zone: Anthracite	515	531	574	562	513
Mozambique: Bituminous	191	240	298	273	283
Nigeria: Bituminous	839	882	913	1,036	831
Rhodesia and Nyasaland, Federation of: Southern Rhodesia: Bituminous	3,654	3,918	4,247	3,897	4,144
Tanganyika: Bituminous	1	2	1	1	2
Union of South Africa: Bituminous and anthracite (marketable)	35,436	37,040	38,325	40,879	40,181
Total	41,498	43,403	45,096	47,141	46,382

See footnotes at end of table.

Digitized by Google

TABLE 68.—World production of bituminous coal, anthracite, and lignite, by countries, 1955–59, in thousand short tons [1]—Continued

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country	1955	1956	1957	1958	1959 [2]
Oceania:					
Australia:					
Bituminous	21,588	21,587	22,310	22,875	22,646
Lignite	11,326	11,827	12,030	13,041	14,526
New Zealand:					
Bituminous and anthracite	877	897	931	939	941
Lignite	1,985	2,046	1,994	2,108	2,205
Total	35,776	36,357	37,265	38,963	40,318
Other countries (estimate)	110	110	110	110	110
Lignite (total of items shown above) (estimate)	590,829	624,124	655,739	678,265	687,771
Bituminous and anthracite (by subtraction)	1,761,839	1,861,580	1,919,448	2,011,537	2,088,134
World total, all grades (estimate)	2,352,668	2,485,704	2,575,187	2,689,802	2,775,905

[1] This table incorporates some revisions.
[2] Preliminary.
[3] Estimate.
[4] Output from U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[5] Year ended Mar. 20 of year following that stated.

TECHNOLOGY

In 1959, congressional and general interest in continuing and expanded coal research was unabated. Research was continued on every aspect of coal technology—mining, preparation, combustion, carbonization, gasification, and related subjects—by Federal, State, industrial, private, and university organizations. A bill providing for an expanded research program to be administered by a new agency, the Coal Research and Development Commission, was approved by the House and Senate but was pocket vetoed by the President, who indicated that such a commission should be administered by the Department of the Interior.

Construction of new and additional research facilities by leading coal producers continued. Island Creek Coal Company's new research center at Holden, W. Va., and Eastern Gas and Fuel Associates' expansion of its laboratories at Everett, Mass., designed for studies on coal carbonization, were completed. Clinchfield Coal Company's new large-scale laboratories at Carbo, Va., were in operation by yearend. Republic Steel Corp. and Bituminous Coal Research, Inc., were planning new facilities.

New mining machines designed for use in coal as thin as 30 inches were introduced. The first production model of a continuous mining machine for thin coalbeds was being tested in a southern West Virginia mine. Self-advancing roof shields were introduced for use at the immediate face with continuous miners. The hydraulic "push-button" method of roof support used in British longwall mines was exhibited at the Coal Exposition in Cleveland.

An electronically controlled continuous mining machine, capable of advancing 1,000 feet underground without a man in the mine, was being developed jointly by a coal concern and equipment company. The new machine is scheduled for operating tests in 1960.

Digitized by Google

The Bureau of Mines began experiments in mining bituminous coal hydraulically at an old mine near Indiana, Pa. Water under a pressure of nearly 4,000 p.s.i. was used successfully to extract coal without preshooting.

A longstanding problem associated with mining, the degasification of coalbeds, was studied by the Bureau of Mines and the University of West Virginia. Methane was removed successfully from the bed in a series of water infusion experiments.

The trend toward bigger stripping and digging equipment continued. Another 70-cubic-yard dipper with a weight of almost 7 million pounds was placed in operation in an Ohio stripping operation. The largest wheel excavator ever erected in the United States was placed in operation. Rated at 3,500 cubic yards per hour, the new machine has a capacity virtually equivalent to the largest stripping shovels.

Seismic analysis, a new technique for quick analysis of strip overburden, was introduced. The process is based on the principle that sound or shock waves travel through different subsurface strata at varying speeds.

Multiple breaking with compressed air was brought to realization in 1959. A series of four holes could be broken in one operation.

New pipelines for transporting coal were being considered: One from near East Liverpool to Ashtabula, Ohio (90 miles), and another across the State of Pennsylvania to move coal from mines in northern West Virginia and western Pennsylvania to electric utility plants on the east coast (New York, New Jersey, and northeastern Pennsylvania).

New tools for coal preparation were introduced. The heavy medium cyclones, developed and used in Europe, were introduced in the United States. The use of the cyclones extends cleaning of dense-medium systems to a minimum of 48-mesh coal and gives high efficiency over a wide range of specific gravities and extraordinarily high feed rate in relation to cyclone diameter.

Other new techniques presented and tested included rubber-coated screens, reported to outlast conventional materials by 5 to 20 times; a short-thrust horizontal picking table for refuse requiring 30 percent less power than conventional tables; and nucleonic density controls for use with heavy-medium systems.

Irradiation and isotopes as an aid in coal processing and quality control were considered. Samples of coal were irradiated to determine effects of such exposure on properties; the Atomic Energy Commission awarded Bituminous Coal Research, Inc., a contract for evaluating the possible application of isotopes to coal mining, transportation, and storage.

The Locomotive Development Committee of Bituminous Coal Research, Inc., loaned its coal-fired gas turbine to the Bureau of Mines for developing a unit that could be used in stationary electric powerplants, particularly for generating power in arid regions.

A firm upsurge in interest in the fuel cell was evident. One of the objectives of high-temperature fuel-cell research has been the integration of a coal gasification unit for producing gaseous fuel for the cell.

Digitized by Google

More than a dozen companies were reportedly working on fuel cells during the year; military interest also continued.

The Bureau of Mines, in cooperation with the American Society of Testing Materials (ASTM), continued work on evaluating proposed international standards for coal analysis and classification. In conjunction with this effort, the Micum test method for coke evaluation was being compared with ASTM methods, and initial tests indicated a high degree of correlation.

Following Curtiss-Wright Corporation's experiments with road-paving materials using a mixture of high-temperature tar and coal, the Kentucky State Highway Department contracted for the material to be used for evaluating its worth in an actual road test that would involve eight to twelve ½-mile test strips at various locations. The material would require approximately 5 to 30 tons of coal per mile of 20-foot highway. At yearend a new organization was formed to study the possible development and application of a new carbonization process in conjunction with the process for making coal-based road-paving binders.

Digitized by Google

Coal—Pennsylvania Anthracite

By Forrest T. Moyer,[1] J. A. Vaughan,[2] and Marian I. Cooke[3]

Contents

	Page		Page
General summary	135	Distribution	169
Scope of report	142	Consumption	175
Acknowledgments	143	Stocks	177
Production, mining methods, and equipment	143	Foreign trade	178
Prices and value of sales	162	World production	181
Employment	168	Technology	181

GENERAL SUMMARY

OUTPUT of Pennsylvania anthracite declined in 1959 but much less than in 1957 or 1958. The 20.6 million tons produced was only 2 percent below 1958. The 1959 tonnage was valued at the preparation plant at $172.3 million—8 percent less than in 1958.

The greater decline in value than in tonnage resulted principally from reduced shipments of the relatively higher priced sizes of anthracite, Pea and larger. The tonnage of these sizes shipped declined 9 percent and represented only 42 percent of the total compared with 45 percent in 1958. On the other hand, the tonnage of the lower priced sizes, Buckwheat No. 1 and smaller, increased 3 percent over 1958 and represented 58 percent of total shipments in 1959. Another factor contributing to the decline in value was the lower average prices received for the larger sizes. In contrast, average prices were higher for the smaller sizes, except Buckwheat No. 1, and for the "Other" size group in which there was no change. Consequently, the average net realization on the total tonnage produced declined to $8.35 per ton, compared with $8.88 in 1958.

Demand for anthracite in the United States, as measured by apparent consumption, declined to 18.8 million tons, only 1 percent below 1958. The tonnage used for space heating doubtless fell more sharply, as is indicated by decreased shipments of Buckwheat No. 3

[1] Physical scientist.
[2] Commodity industry analyst.
[3] Commodity research assistant.

Digitized by Google

and larger sizes. The reduced demand for these sizes undoubtedly reflected continued losses to competitive fuels. However, the weather also was a factor, as it was generally warmer than in 1958. According to the Anthracite Institute, heat demand (degree-days) in the primary anthracite market area averaged 7 percent less than in 1958 and 2 percent less than in a year of normal temperature (average 1921–50). Demand for the fine sizes, Buckwheat Nos. 4 and 5 and the "Other" group, was strong in 1959. Increased shipments of these sizes nearly offset the decline in shipments of the larger sizes commonly used for space heating.

Foreign demand for Pennsylvania anthracite slumped in 1959, and only 1.8 million tons was shipped to destinations outside the United States. This tonnage was 22 percent below 1958 and was the lowest annual tonnage exported since 1936. Most of the decline resulted from decreased shipments to Europe, where coal stocks have been excessive for some time. The tonnage destined to Canada in 1959 was only 5 percent below 1958, but exports to all other foreign destinations declined 56 percent.

The percentages of production from the several sources of anthracite changed rather sharply from 1958, owing principally to the mine-flood disaster in the Northern field early in 1959. This disaster destroyed underground productive capacity estimated at 1.4 million tons per year, the jobs of approximately 1,800 men, and a large quantity of mining equipment. Output from deep mines decreased to 46 percent of the total compared with 51 percent in 1958. On the other hand, the proportions from strip mines and culm banks increased to 34 and 17 percent, respectively, from 32 and 14 percent in 1958. Dredges contributed 3 percent of the output in both years.

The average number of men working at anthracite operations declined 12 percent to 23,294, owing principally to increased output at strip mines and culm banks. As the reduced labor force worked an average of only 173 days, 10 less than in 1958, the actual worktime of slightly more than 4 million man-days was 17 percent less than in 1958. Because of the greater activity at the more productive strip mines and culm banks, output per man-day advanced to a new record of 5.12 tons.

A new wage agreement between the producing companies and the United Mine Workers of America became effective February 1, 1959. The major benefits for employees were a wage increase of $1 per day, a $20 increase in vacation pay to a total of $160, and an increase in payments to the miners' health and welfare fund from $0.50 to $0.70 per ton of anthracite produced for use or sale. As a result of the wage increase, the average hourly earnings for anthracite workers, as reported by the U.S. Department of Labor, increased to $2.75 in 1959 compared with $2.63 in 1958.

The overall injury experience of the industry was not favorable in 1959. A total of 47 men lost their lives in anthracite operations at a frequency rate of 1.60 per million man-hours of worktime, the worst annual fatality rate since 1942. Twelve miners were killed in the mine-flood disaster in the Northern anthracite field in January when

Digitized by Google

the Susquehanna River broke into active mine workings. This was the first major disaster in the industry since five men were killed in March 1952 by an inrush of water from abandoned workings. The number of nonfatal injuries declined from 2,124 in 1958 to 1,723 in 1959. However, owing to reduced worktime, the frequency rate of 58.66 per million man-hours for nonfatal injuries in 1959 was only slightly lower than the rate of 59.88 in 1958. The slight improvement in the nonfatal-injury rate can be ascribed to the greater activity in 1959 at the less hazardous strip mines, culm banks, and dredges.

Table 1 summarizes the annual data for 1955–59, and Table 2 monthly developments in the Pennsylvania anthracite industry in 1959. Table 3 presents selected historical data for the period, 1890–1959.

TABLE 1.—Salient statistics of the Pennsylvania anthracite industry, 1955–59

	1955	1956	1957	1958	1959
Production:					
Loaded at mines for shipment outside producing region:					
Breakers and washeries net tons	21,250,344	23,581,689	20,355,414	15,497,828	15,047,444
Dredges do	752,580	688,379	630,237	631,717	716,169
Sold to local trade and used by employees net tons	3,782,366	4,288,532	4,073,406	[1] 4,846,646	4,757,088
Used at collieries for power and heat net tons	419,264	341,620	279,264	194,951	128,585
Total production do	26,204,554	28,900,220	25,338,321	21,171,142	20,649,286
Value at breaker, washery, or dredge	$206,096,662	$236,785,062	$227,753,802	$187,898,316	$172,319,913
Average sales realization per net ton on breaker and washery shipments to points outside producing region:					
Pea and larger	$10.83	$11.50	$12.50	$11.76	$10.93
Buckwheat No. 1 and smaller	$5.05	$5.31	$6.38	$6.94	$6.88
Total all sizes	$8.00	$8.33	$9.11	$9.31	$8.77
Percentage of total breaker and washery shipments to points outside producing region:					
Pea and larger	51.0	48.8	44.6	49.1	46.6
Buckwheat No. 1 and smaller	49.0	51.2	55.4	50.9	53.4
Producers' stocks at end of year [2] net tons	719,569	341,505	499,620	406,375	429,020
Exports [3] do	3,152,313	5,244,349	4,331,785	2,279,859	1,787,558
Imports [3] do	170	46	1,138	4,363	2,633
Consumption (apparent) do	23,600,000	24,000,000	20,800,000	19,000,000	18,800,000
Average number of days worked	[4] 197	216	196	183	173
Average number of men working daily	[4] 33,523	31,516	30,825	26,540	23,294
Output per man per day net tons	[4] 3.96	4.25	4.18	4.36	5.12
Output per man per year do	[4] 780	918	819	798	886
Quantity cut by machines do	393,932	400,402	292,307	184,028	260,502
Quantity mined by stripping do	7,703,907	8,354,230	7,543,157	6,877,761	7,096,343
Quantity loaded by machines underground net tons	6,660,939	7,308,110	6,657,479	5,332,043	4,700,542
Distribution:					
Total receipts in New England [5] net tons	1,718,404	1,619,605	1,264,726	1,012,035	869,166
Exports to Canada [3] do	2,434,981	2,356,351	1,778,551	1,522,408	1,453,228
Loaded into vessels at Lake Erie [6] net tons	467,886	588,085	454,121	260,050	329,204
Receipts at Duluth-Superior [7] net tons	170,754	311,599	260,931	93,499	71,846

[1] An undetermined part included in local sales in 1958 was reported as shipped outside region in 1957.
[2] Anthracite Committee.
[3] U.S. Department of Commerce.
[4] Estimated.
[5] Commonwealth of Massachusetts, Division on the Necessaries of Life, and Association of American Railroads.
[6] Ore and Coal Exchange, Cleveland, Ohio.
[7] U.S. Engineer Office, Duluth, Minn.

Digitized by Google

TABLE 2.—Statistical summary of monthly developments

(All tonnage figures

	January	February	March	April	May
Production (including mine fuel, local sales, and dredge coal	2,318,000	1,645,000	1,593,000	1,588,000	1,466,000
Shipments (breakers and washeries only, all sizes):					
By rail [1]	1,303,294	796,301	724,633	874,804	977,056
By truck [2]	1,087,940	754,268	696,240	661,762	566,953
Carbonization [3]	23,533	16,419	16,353	18,947	20,694
Distribution:					
Lake Erie loadings [4]				36,770	64,687
Lake Ontario loadings [5]					2,450
Receipts at Duluth-Superior [6]					15,389
Upper Lake dock trade: [7]					
Receipts:					
Lake Superior		47			15,359
Lake Michigan	3,008	3,102	1,133	7,033	10,804
Deliveries (reloadings):					
Lake Superior	7,778	7,309	2,900	3,055	9,705
Lake Michigan	8,011	6,609	3,614	2,187	3,839
New England receipts:					
Tidewater [8]					
Rail [9]	103,281	61,387	55,510	44,680	61,931
Exports [8]	180,942	165,987	108,423	78,512	157,634
Imports [8]	378	64	415		671
Industrial consumption and stocks:					
Railroads (Class 1 only): [3]					
Consumption	43,679	37,212	36,952	25,050	17,763
Stocks	36,477	31,948	27,784	25,621	24,248
Electric utilities: [10]					
Consumption	237,411	203,613	196,220	217,853	228,464
Stocks	2,207,212	2,105,583	2,023,413	1,986,894	1,955,177
Used for cokemaking:					
Consumption	28,400	28,100	31,900	29,000	33,400
Stocks	87,314	71,101	49,463	61,706	73,204
Stocks on Upper Lake docks: [7]					
Lake Superior	49,578	45,771	42,971	39,878	45,532
Lake Michigan	22,075	18,650	16,169	24,192	31,157
Producers' stocks [12]	328,814	298,486	280,977	329,385	371,677
Stocks in retail dealer yards [13]	1,172,000	911,000	726,000	782,000	852,000
Retail dealer deliveries [14]	1,158,000	943,000	774,000	417,000	369,000
Wholesale price indexes (1947–49=100): [15] f.o.b. mines:					
Chestnut	126.5	131.4	129.6	117.5	117.5
Pea	123.5	129.9	129.1	119.3	119.3
Buckwheat No. 1	163.0	172.2	171.5	155.3	155.3
Buckwheat No. 3	181.4	192.7	192.7	192.7	192.7
Employee wages and hours: [16]					
Average weekly earnings	$91.24	$74.79	$76.45	$88.55	$85.45
Average hourly earnings	$2.66	$2.77	$2.77	$2.75	$2.73
Average number hours worked per week	34.3	27.0	27.6	32.2	31.3

[1] Furnished by Anthracite Institute.
[2] Pennsylvania Department of Mines and Mineral Industries.
[3] Association of American Railroads.
[4] Ore and Coal Exchange, Cleveland, Ohio.
[5] Buffalo Branch, Ore and Coal Exchange, Cleveland, Ohio.
[6] U.S. Engineer Office, Duluth, Minn.
[7] Includes all commercial docks on Lake Superior and west shore of Lake Michigan as far south as Kenosha. Data supplied by Upper Lake Docks Coal Bureau, Inc., and direct reports to the Bureau of Mines.

Digitized by Google

in the Pennsylvania anthracite industry in 1959

represent net tons)

June	July	August	Septem-ber	October	Novem-ber	Decem-ber	Year 1959	Change from 1958 (per-cent)	Year 1958
1,777,000	1,206,000	1,600,000	1,823,000	1,805,000	1,863,000	1,965,000	20,649,000	−2.5	21,171,000
1,143,503	685,974	908,381	1,039,449	1,054,964	1,019,133	1,009,286	11,426,678	−11.8	12,956,593
631,142	467,882	617,311	765,255	731,221	785,802	907,657	8,672,373	−4.2	9,049,259
23,429	14,556	19,036	22,142	21,793	20,594	19,895	237,891	−9.4	262,675
61,446	9,632	40,106	19,682	43,533	47,743	5,605	329,204	+26.6	260,050
3,211	2,836	2,532	5,846	4,690	2,353	----------	23,918	+139.0	10,008
17,013	7,492	----------	----------	22,947	9,005	----------	71,846	−23.2	93,495
16,885	7,526	42	----------	22,981	9,058	43	71,941	−23.1	93,560
3,412	2,362	3,151	4,763	1,206	2,062	1,683	43,719	−30.7	63,088
6,544	1,398	2,385	3,237	19,950	10,589	7,815	82,665	−27.1	113,414
4,932	5,663	3,931	4,118	5,846	4,265	3,562	56,577	−20.1	70,804
1,773	----------	----------	----------	----------	----------	----------	1,773	−45.9	3,279
85,451	68,178	72,114	80,805	83,934	81,575	68,547	867,393	−14.0	1,008,756
105,905	119,477	108,424	216,711	179,911	212,891	152,741	1,787,558	−21.6	2,279,859
127	----------	822	68	----------	----------	88	2,633	−39.7	4,363
13,230	11,439	11,191	12,090	17,701	26,460	38,734	291,501	−12.9	334,610
30,044	31,726	33,845	34,155	35,748	40,291	31,899	31,899	−20.9	40,349
237,557	235,549	215,891	225,944	200,338	211,613	228,373	2,638,826	−5.3	[11] 2,785,770
1,953,709	1,918,133	1,932,254	1,971,350	1,999,680	2,054,655	2,017,993	2,017,993	−9.8	2,236,265
30,800	29,400	29,500	28,200	33,700	33,600	32,900	368,800	+44.7	254,785
84,874	74,957	95,529	96,480	106,230	117,243	108,893	108,893	+5.1	103,599
55,834	61,962	59,619	56,382	59,406	57,875	49,872	49,872	−13.2	57,432
29,719	26,418	32,657	33,302	28,662	26,459	24,580	24,580	−9.2	27,078
394,849	411,217	442,348	466,938	469,988	445,161	429,020	429,020	+5.6	406,375
1,028,000	1,056,000	1,154,000	1,184,000	1,175,000	1,146,000	1,034,000	1,034,000	−16.6	1,240,000
437,000	439,000	409,000	602,000	660,000	597,000	757,000	7,562,000	−19.4	9,386,000
117.5	121.2	121.2	124.9	128.6	128.6	128.6	124.4	−.5	125.0
119.3	123.0	123.0	127.4	129.7	129.7	129.7	125.2	+3.4	121.1
155.3	158.5	158.5	162.2	163.8	163.8	163.8	161.9	+1.3	159.9
192.7	193.6	194.4	195.2	196.1	196.1	196.1	193.0	+6.5	181.2
$82.75	$79.20	$76.73	$88.36	$82.80	$93.84	$94.73	$84.98	+11.8	$76.01
$2.74	([17])	$2.75	$2.77	$2.76	$2.76	$2.77	[18] $2.75	+4.6	$2.63
30.2	([17])	27.9	31.9	30.0	34.0	34.2	[18] 30.9	+6.9	28.9

[8] Furnished by Commonwealth of Massachusetts, Division on the Necessaries of Life.
[9] U.S. Department of Commerce.
[10] Federal Power Commission.
[11] Revised.
[12] Anthracite Committee. Represents coal in ground storage on nearest available date to end of month.
[13] Estimated from reports submitted by a selected list of retail dealers.
[14] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.
[15] Bureau of Labor Statistics. Based on data obtained from authorized trade publications.
[16] Bureau of Labor Statistics.
[17] Not available.
[18] 11-month average.

Digitized by Google

TABLE 3.—Statistical trends in the Pennsylvania anthracite industry, 1890–1959

	Production (net tons)	Value of production	Average value per net ton	Exports [1] (net tons)	Imports [1] (net tons)	Apparent consumption [2] (net tons)	Average number of employees	Average number of days worked	Average tons per man per day	Average tons per man per year	Quantity cut by machines [3] (net tons)	Quantity produced by stripping [4] (net tons)	Quantity loaded mechanically underground [5] (net tons)
1890	46,468,641	$66,383,772	$1.43	889,655	16,962	45,596,000	126,000	200	1.85	369			
1891	50,665,431	73,944,735	1.46	964,601	42,120	49,743,000	126,350	203	1.98	401			
1892	52,472,504	82,442,000	1.57	953,836	72,865	51,592,000	129,050	198	2.06	407			
1893	53,967,543	85,687,078	1.59	1,493,281	60,220	52,534,000	132,944	197	2.06	406			
1894	51,921,121	78,488,063	1.51	1,613,500	100,876	50,408,000	131,603	190	2.08	395			
1895	57,999,337	82,019,272	1.41	1,647,195	158,297	56,510,000	142,917	196	2.07	406			
1896	54,346,081	81,748,651	1.50	1,512,000	113,892	52,948,000	148,991	174	2.10	365			
1897	52,611,681	79,301,954	1.51	1,454,620	27,478	51,185,000	149,884	150	2.34	351			
1898	53,382,645	75,414,537	1.41	1,513,062	3,527	51,873,000	145,504	152	2.41	367			
1899	60,418,005	88,142,130	1.46	1,912,732	68	58,505,000	139,608	173	2.50	433			
1900	57,367,915	85,757,851	1.49	1,853,163	132	55,515,000	144,206	166	2.40	398			
1901	67,471,667	112,504,020	1.67	2,232,504	320	65,239,000	145,309	196	2.37	464			
1902	41,373,595	76,173,586	1.84	1,016,934	190,636	40,547,000	148,141	116	2.40	279			
1903	74,607,068	152,036,448	2.04	2,249,920	196,837	72,554,000	150,483	206	2.41	496			
1904	73,156,709	138,974,020	1.90	2,495,799	81,232	70,742,000	155,861	200	2.35	469			
1905	77,659,850	141,879,000	1.83	2,497,581	38,350	75,201,000	165,406	215	2.18	470			
1906	71,282,411	131,917,694	1.85	2,483,005	36,236	68,836,000	162,355	195	2.25	439			
1907	85,604,312	163,584,056	1.91	3,021,841	11,085	82,594,000	167,234	220	2.33	512			
1908	83,268,754	158,178,849	1.90	3,082,641	18,462	80,205,000	174,174	200	2.39	478			
1909	81,070,359	149,181,587	1.84	3,183,840	3,574	77,890,000	[6] 171,195	205	[7] 2.31	[7] 474			
1910	84,485,236	160,275,302	1.90	3,384,222	9,180	81,110,000	169,497	229	2.17	498			
1911	90,464,067	175,189,392	1.94	3,980,479	2,759	86,486,000	172,585	246	2.13	524	69,907		
1912	84,361,598	177,622,626	2.11	4,131,444	1,870	80,232,000	174,030	231	2.10	485	246,216		
1913	91,524,922	195,181,127	2.13	4,652,912	1,004	86,474,000	175,745	257	2.02	520	555,776		
1914	90,821,507	188,181,399	2.07	4,289,873	17,696	84,041,000	179,679	245	2.06	505	916,596		
1915	88,995,061	184,653,498	2.07	3,965,255	814	88,144,000	176,552	230	2.19	504	1,307,756	1,121,603	
1916	87,578,493	202,009,561	2.31	4,665,530	6,000	87,118,000	159,869	253	2.16	548	1,839,506	1,987,800	
1917	99,611,811	283,650,723	2.85	6,007,306	13,000	94,068,000	154,174	285	2.27	646	1,955,223	2,301,588	
1918	98,826,084	336,480,347	3.40	4,967,808	37,272	92,775,000	147,121	293	2.29	672	1,857,514	2,360,183	
1919	88,092,201	364,926,950	4.14	4,976,598	82,818	81,518,000	154,571	266	2.14	570	1,575,205	2,006,879	
1920	89,598,249	434,252,198	4.85	5,403,749	31,748	85,786,000	145,074	271	2.28	618	938,073	2,054,441	
1921	90,473,451	452,304,903	5.00	4,677,368	8,894	81,950,000	159,499	271	2.09	567	979,145	2,027,790	
1922	54,683,022	273,700,125	5.01	2,649,457	233,528	56,799,000	156,849	151	2.31	349	502,793	949,745	
1923	93,339,009	506,786,768	5.43	5,090,138	300,360	86,914,000	157,743	268	2.21	592	1,208,542	2,263,098	
1924	87,926,862	477,230,852	5.43	4,017,785	117,951	80,717,000	160,009	274	2.00	550	1,423,884	1,865,677	
1925	61,817,149	327,664,512	5.30	3,179,006	382,894	64,061,000	160,312	182	2.12	386	941,189	1,578,478	
1926	84,437,452	474,164,252	5.62	4,029,683	813,956	77,221,000	165,386	244	2.09	511	931,650	2,401,356	
1927	80,095,504	420,941,726	5.26	3,325,507	119,030	74,672,000	165,259	225	2.15	485	1,171,888	2,153,156	[8] 2,223,281
1928	75,348,069	393,637,690	5.22	3,336,272	384,707	73,650,000	160,681	217	2.17	469	1,289,809	2,422,924	[8] 2,351,074
1929	73,828,195	385,642,751	5.22	3,406,369	487,172	71,457,000	151,501	225	2.16	487	1,159,910	1,911,766	3,470,158
1930	69,384,837	354,574,191	5.11	2,551,659	674,812	67,628,000	150,804	208	2.21	460	1,410,123	2,536,288	4,467,750

Digitized by Google

1931	59, 645, 652	296, 354, 586	4. 97	1, 778, 308	637, 951	58, 408, 000	139, 431	181	2. 37	428	1, 687, 265	3, 813, 237	4, 384, 780
1932	49, 855, 221	222, 375, 129	4. 46	1, 303, 355	607, 097	50, 500, 000	121, 243	162	2. 54	411	1, 674, 223	3, 980, 973	5, 438, 340
1933	49, 541, 344	206, 718, 405	4. 17	1, 034, 562	456, 252	49, 600, 000	104, 633	182	2. 60	473	1, 648, 249	4, 932, 009	6, 557, 267
1934	57, 168, 291	244, 152, 245	4. 27	1, 297, 610	478, 118	55, 500, 000	109, 050	207	2. 53	524	1, 981, 088	5, 798, 138	9. 284, 486
1935	52, 158, 783	210, 130, 565	4. 03	1, 608, 549	571, 439	51, 100, 000	103, 269	189	2. 68	505	1. 848, 095	5, 187, 072	9, 279, 057
1936	54, 579, 535	227, 003, 538	4. 16	1, 678, 024	614, 639	53, 200, 000	102, 081	192	2. 79	535	2, 162, 744	6, 203, 267	10, 827, 946
1937	51, 856, 433	197, 598, 849	3. 81	1, 914, 173	895, 737	50, 400, 000	99, 085	189	2. 77	523	1, 984, 512	5, 696, 018	10, 683, 837
1938	46, 099, 027	180, 600, 167	3. 92	1, 908, 911	362, 895	45, 200, 000	96, 417	171	2. 79	478	1, 588, 407	5, 095, 341	10, 151, 669
1939	51, 487, 377	187, 175, 324	3. 64	2, 590, 000	298, 153	49, 700, 000	93, 138	183	3. 02	553	1, 881, 884	5, 486, 479	11, 773, 833
1940	51, 484, 640	205, 489, 814	3. 99	2, 607, 632	135, 436	49, 000, 000	91. 313	186	3. 02	562	1, 816, 483	6, 352, 700	12, 326, 000
1941	[8] 56, 368, 267	240, 275, 126	4. 26	3, 380, 189	74, 669	52, 700, 000	88, 054	203	[9] 3. 04	617	1, 855, 422	7, 316, 574	13, 441, 987
1942	[8] 60, 327, 729	271, 673, 380	4. 50	4, 438, 588	140, 115	56, 500, 000	82. 121	239	[9] 2. 95	705	2, 285. 640	9, 070. 933	14, 741, 459
1943	[8] 60, 643, 620	306, 816, 018	5. 06	4, 138, 690	166, 020	57, 100, 000	79, 153	270	[9] 2. 78	751	1, 624, 883	8, 989, 387	14, 745, 793
1944	[8] 63, 701, 363	354, 582, 884	5. 57	4, 185, 933	11, 847	59, 400, 000	77, 591	292	[9] 2. 79	815	1, 336, 082	10, 953, 030	14, 975, 146
1945	[8] 54, 933, 909	323, 944, 435	5. 90	3, 691, 247	149	51, 600, 000	72, 842	269	[9] 2. 79	751	1, 210, 171	10, 056, 325	13, 927, 955
1946	[8] 60, 506, 873	413, 417, 070	6. 83	6, 497, 245	9, 556	53, 900, 000	78, 145	271	[9] 2. 84	770	1, 232, 828	12, 858, 930	15, 619, 162
1947	[8] 57, 190, 009	413, 019, 486	7. 22	8, 509, 995	10, 350	48, 200, 000	78, 600	259	[9] 2. 78	720	1, 209, 983	12, 603, 545	16, 054. 011
1948	[8] 57, 139, 948	467, 051, 800	8. 17	6, 675, 914	945	50, 200, 000	76, 215	265	[9] 2. 81	745	1, 016, 757	13, 352, 874	15, 742, 368
1949	[8] 42, 701, 724	358, 008, 451	8. 38	4, 942, 670	----------	37, 700, 000	75, 377	195	[9] 2. 87	560	557, 599	10, 376, 808	11, 858, 088
1950	[8] 44, 076, 703	392, 398, 006	8. 90	3, 891, 569	18, 289	39, 900, 000	72, 624	211	[9] 2. 83	597	611, 734	11, 833, 934	12, 335, 650
1951 [10]	42, 669, 997	405, 817, 963	9. 51	5, 955, 535	26, 812	37, 000, 000	68, 995	208	2. 97	618	496, 085	11, 135, 990	10, 847, 787
1952	40, 582, 558	379, 714, 076	9. 36	4, 592, 060	29, 370	35, 300, 000	65, 923	201	3. 06	615	386, 128	10, 696, 705	10, 034, 464
1953	30, 949, 152	299, 139. 687	9. 67	2, 724, 270	31, 443	28, 000, 000	57, 862	163	3. 28	535	318, 699	8, 606, 482	6, 838, 769
1954	29, 083, 477	247, 870, 023	8. 52	2, 851, 239	5, 831	26, 900, 000	43, 996	164	4. 02	659	381, 424	7, 939, 680	6, 978, 035
1955	26, 204, 554	206, 096, 662	7. 86	3, 152, 313	170	23, 600, 000	[11] 33, 523	[11] 197	[11] 3. 96	[11] 780	393, 932	7, 703, 907	6, 660, 939
1956	28, 900, 220	236, 785, 062	8. 19	5, 244, 349	46	24, 000, 000	31, 516	216	4. 25	918	400, 402	8, 354, 230	7, 308, 110
1957	25, 338, 321	227, 753, 802	8. 99	4, 331, 785	1, 138	20, 800, 000	30, 825	196	4. 18	819	292, 307	7, 543, 157	6, 657, 479
1958	21, 171, 142	187, 898, 316	8. 88	2, 279, 859	4, 363	19. 000, 000	26, 540	183	4. 36	798	184, 028	6, 877, 761	5, 332, 043
1959	20, 649, 286	172, 319, 913	8. 35	1, 787, 558	2, 633	18, 800, 000	23. 294	173	5. 12	886	260, 502	7, 096, 343	4, 700, 542

[1] U.S. Department of Commerce.
[2] Before 1913 the figures of consumption take no account of producers' stocks, there being no data available for this item.
[3] Data first collected in 1911.
[4] Data first collected in 1915.
[5] Data first collected in 1929.
[6] As reported by the Commonwealth of Pennsylvania, Department of Mines.
[7] Calculated on basis of Pennsylvania Department of Mines employment data.
[8] Includes some "bootleg" coal purchased by authorized operators and prepared at their breakers.
[9] Output per man calculated on authorized tonnages only; bootleg purchases excluded.
[10] Figures for 1951 and subsequent years are not strictly comparable with previous years. See Production and Employment sections, Coal—Pennsylvania Anthracite, Minerals Yearbook, 1951.
[11] Estimated.

Digitized by Google

TABLE 3.—Statistical trends in the Pennsylvania anthracite industry, 1890–1959

	Production (net tons)	Value of production	Average value per net ton	Exports [1] (net tons)	Imports [1] (net tons)	Apparent consumption [2] (net tons)	Average number of employees	Average number of days worked	Average tons per man per day	Average tons per man per year	Quantity cut by machines [3] (net tons)	Quantity produced by stripping [4] (net tons)	Quantity loaded mechanically underground [5] (net tons)
1890	46, 468, 641	$66, 383, 772	$1.43	889, 655	16, 962	45, 596, 000	126, 000	200	1.85	369			
1891	50, 665, 431	73, 944, 735	1.46	964, 601	42, 120	49, 743, 000	126, 350	203	1.98	401			
1892	52, 472, 504	82, 442, 000	1.57	953, 836	72, 865	51, 592, 000	129, 050	198	2.06	407			
1893	53, 967, 543	85, 687, 078	1.59	1, 493, 281	60, 220	52, 534, 000	132, 944	197	2.06	406			
1894	51, 921, 121	78, 488, 063	1.51	1, 613, 500	100, 876	50, 408, 000	131, 603	190	2.08	395			
1895	57, 999, 337	82, 019, 272	1.41	1, 647, 195	158, 297	56, 510, 000	142, 917	196	2.07	406			
1896	54, 346, 081	81, 748, 651	1.50	1, 512, 000	113, 892	52, 948, 000	148, 991	174	2.10	365			
1897	52, 611, 681	79, 301, 954	1.51	1, 454, 620	27, 478	51, 185, 000	149, 884	150	2.34	351			
1898	53, 382, 645	75, 414, 537	1.41	1, 513, 062	3, 527	51, 873, 000	145, 504	152	2.41	367			
1899	60, 418, 005	88, 142, 130	1.46	1, 912, 732	68	58, 505, 000	139, 608	173	2.50	433			
1900	57, 367, 915	85, 757, 851	1.49	1, 853, 163	132	55, 515, 000	144, 206	166	2.40	398			
1901	67, 471, 667	112, 504, 020	1.67	2, 232, 504	320	65, 239, 000	145, 309	196	2.37	464			
1902	41, 373, 595	76, 173, 586	1.84	1, 016, 934	190, 636	40, 547, 000	148, 141	116	2.40	279			
1903	74, 607, 068	152, 036, 448	2.04	2, 249, 920	196, 837	72, 554, 000	150, 483	206	2.41	496			
1904	73, 156, 709	138, 974, 020	1.90	2, 495, 799	81, 232	70, 742, 000	155, 861	200	2.35	469			
1905	77, 659, 850	141, 879, 000	1.83	2, 497, 581	38, 350	75, 201, 000	165, 406	215	2.18	470			
1906	71, 282, 411	131, 917, 094	1.85	2, 483, 005	36, 236	68, 836, 000	162, 355	195	2.25	439			
1907	85, 604, 312	163, 584, 056	1.91	3, 021, 841	11, 085	82, 594, 000	167, 234	220	2.33	512			
1908	83, 268, 754	158, 178, 849	1.90	3, 082, 641	18, 462	80, 205, 000	174, 174	200	2.39	478			
1909	81, 070, 359	149, 181, 587	1.84	3, 183, 840	3, 574	77, 890, 000	[6] 171, 195	205	[7] 2.31	[7] 474			
1910	84, 485, 236	160, 275, 302	1.90	3, 384, 222	9, 180	81, 110, 000	169, 497	229	2.17	498			
1911	90, 464, 067	175, 189, 392	1.94	3, 980, 479	2, 759	86, 486, 000	172, 585	246	2.13	524	69, 907		
1912	84, 361, 598	177, 622, 626	2.11	4, 131, 444	1, 870	80, 232, 000	174, 030	231	2.10	485	246, 216		
1913	91, 524, 922	195, 181, 127	2.13	4, 652, 912	1, 004	85, 474, 000	175, 745	257	2.02	520	555, 776		
1914	90, 821, 507	188, 181, 399	2.07	4, 289, 873	17, 696	84, 041, 000	179, 679	245	2.06	505	916, 596		
1915	88, 995, 061	184, 653, 498	2.07	3, 965, 255	814	88, 144, 000	176, 552	230	2.19	504	1, 307, 756	1, 121, 603	
1916	87, 578, 493	202, 009, 561	2.31	4, 665, 530	6, 000	87, 118, 000	159, 869	253	2.16	548	1, 839, 506	1, 987, 800	
1917	99, 611, 811	283, 650, 723	2.85	6, 007, 306	13, 000	94, 068, 000	154, 174	285	2.27	646	1, 955, 223	2, 301, 588	
1918	98, 826, 084	336, 480, 347	3.40	4, 967, 808	37, 272	92, 775, 000	147, 121	293	2.29	672	1, 857, 514	2, 360, 183	
1919	88, 092, 201	364, 926, 950	4.14	4, 976, 598	82, 818	81, 518, 000	154, 571	266	2.14	570	1, 575, 205	2, 000, 879	
1920	89, 598, 249	434, 252, 198	4.85	5, 403, 749	31, 748	85, 786, 000	145, 074	271	2.28	618	938, 073	2, 054, 441	
1921	90, 473, 451	452, 304, 903	5.00	4, 677, 368	8, 894	81, 950, 000	159, 499	271	2.09	567	979, 145	2, 027, 790	
1922	54, 683, 022	273, 700, 125	5.01	2, 649, 457	233, 528	56, 799, 000	156, 849	151	2.31	349	502, 793	949, 745	
1923	93, 339, 009	506, 786, 768	5.43	5, 090, 138	300, 360	86, 914, 000	157, 743	268	2.21	592	1, 208, 542	2, 263, 098	
1924	87, 926, 862	477, 230, 852	5.43	4, 017, 785	117, 951	80, 717, 000	160, 009	274	2.00	550	1, 423, 884	1, 865, 677	
1925	61, 817, 149	327, 664, 512	5.30	3, 179, 006	382, 894	64, 061, 000	160, 312	182	2.12	386	941, 189	1, 578, 478	
1926	84, 437, 452	474, 164, 252	5.62	4, 029, 683	813, 956	77, 221, 000	165, 386	244	2.09	511	931, 650	2, 401, 358	
1927	80, 095, 564	420, 941, 726	5.26	3, 325, 507	119, 030	74, 672, 000	165, 259	225	2.15	485	1, 171, 888	2, 153, 156	[8] 2, 223, 281
1928	75, 348, 069	393, 037, 690	5.22	3, 330, 272	384, 707	73, 650, 000	160, 681	217	2.17	469	1, 289, 809	2, 422, 924	[8] 2, 351, 074
1929	73, 828, 195	385, 042, 751	5.22	3, 406, 369	487, 172	71, 457, 000	151, 501	225	2.16	487	1, 159, 910	1, 911, 766	3, 470, 158
1930	69, 384, 837	354, 574, 191	5.11	2, 551, 659	674, 812	67, 628, 000	150, 804	208	2.21	460	1, 410, 123	2, 536, 288	4, 467, 750

Digitized by Google

1931	59, 645, 552	296, 354, 586	4. 97	1, 778, 808	637, 951	58, 408, 000	139, 431	181	2. 37	428	1, 587, 265	3, 813, 237	4, 384, 780
1932	49, 855, 221	222, 375, 129	4. 46	1, 303, 355	607, 097	50, 500, 000	121, 243	162	2. 54	411	1, 674, 223	3, 980, 073	5, 433, 340
1933	49, 541, 344	206, 718, 405	4. 17	1, 034, 562	456, 252	49, 600, 000	104, 633	182	2. 60	473	1, 648, 249	4, 932, 069	6, 557, 267
1934	57, 168, 291	244, 152, 245	4. 27	1, 297, 610	478, 118	55, 500, 000	109, 050	207	2. 53	524	1, 981, 088	5, 798, 138	9. 284, 486
1935	52, 158, 783	210, 130, 565	4. 03	1, 608, 549	571, 439	51, 100, 000	103, 269	189	2. 68	505	1, 848, 095	5, 187, 072	9, 279, 057
1936	54, 579, 535	227, 003, 538	4. 16	1, 678, 024	614, 639	53, 200, 000	102, 081	192	2. 79	535	2, 162, 744	6, 203, 267	10, 827, 946
1937	51, 856, 433	197, 598, 849	3. 81	1, 914, 173	395, 737	50, 400, 000	99, 085	189	2. 77	523	1, 984, 512	5, 696, 018	10, 683, 837
1938	46, 099, 027	180, 600, 167	3. 92	1, 908, 911	362, 895	45, 200, 000	96, 417	171	2. 79	478	1, 588, 407	5, 095, 341	10, 151, 669
1939	51, 487, 377	187, 175, 324	3. 64	2, 590, 000	298, 153	49, 700, 000	93, 138	183	3. 02	553	1, 881, 884	5, 486, 479	11, 773, 833
1940	51, 484, 640	205, 489, 814	3. 99	2, 667, 632	135, 436	49, 000, 000	91, 313	186	3. 02	562	1, 816, 483	6, 352, 700	12, 326, 000
1941	[8] 56, 368, 267	240, 275, 126	4. 26	3, 380, 189	74, 669	52, 700, 000	88, 054	203	[9] 3. 04	617	1, 855, 422	7, 316, 574	13, 441, 987
1942	[8] 60, 327, 729	271, 073, 380	4. 50	4, 438, 588	140, 115	56, 500, 000	82, 121	239	[9] 2. 95	705	2, 285, 640	9, 070, 933	14, 741, 459
1943	[8] 60, 643, 620	306, 816, 018	5. 06	4, 138, 680	166, 020	57, 100, 000	79, 153	270	[9] 2. 78	751	1, 624, 883	8, 989, 387	14, 745, 793
1944	[8] 63, 701, 363	354, 582, 884	5. 57	4, 185, 933	11, 847	59, 400, 000	77, 591	292	[9] 2. 79	815	1, 336, 082	10, 953, 030	14, 975, 146
1945	[8] 54, 933, 909	323, 944, 435	5. 90	3, 691, 247	149	51, 600, 000	72, 842	269	[9] 2. 79	751	1, 210, 171	10, 056, 325	13, 927, 955
1946	[8] 60, 506, 873	413, 417, 070	6. 83	6, 497, 245	9, 556	53, 900, 000	78, 145	271	[9] 2. 84	770	1, 232, 828	12, 858, 930	15, 619, 162
1947	[8] 57, 190, 009	413, 019, 486	7. 22	8, 509, 995	10, 350	48, 200, 000	78, 600	259	[9] 2. 78	720	1, 209, 983	12, 603, 545	16, 054. 011
1948	[8] 57, 139, 948	467, 051, 800	8. 17	6, 675, 914	945	50, 200, 000	76, 215	265	[9] 2. 81	745	1, 016, 757	13, 352, 874	15, 742, 368
1949	[8] 42, 701, 724	358, 008, 451	8. 38	4, 942, 070	----------	37, 700, 000	75, 377	195	[9] 2. 87	560	557, 599	10, 376, 808	11, 858, 088
1950	[8] 44, 076, 703	392, 398, 006	8. 90	3, 891, 569	18, 289	39, 900, 000	72, 624	211	[9] 2. 83	597	611, 734	11, 833, 934	12, 335, 650
1951 [10]	42, 669, 997	405, 817, 963	9. 51	5, 955, 535	26, 812	37, 000, 000	68, 995	208	2. 97	618	496, 085	11, 135, 990	10, 847, 787
1952	40, 582, 558	379, 714, 076	9. 36	4, 592, 060	29, 370	35, 300, 000	65, 923	201	3. 06	615	386, 128	10, 696, 705	10, 034, 464
1953	30, 949, 152	299, 139. 687	9. 67	2, 724, 270	31, 443	28. 000, 000	57, 862	163	3. 28	535	318, 699	8, 606, 482	6, 838, 760
1954	29, 083, 477	247, 870, 023	8. 52	2, 851, 239	5, 831	26, 900, 000	43, 996	164	4. 02	659	381, 424	7, 939, 680	6, 978, 035
1955	26, 204, 554	206, 096, 662	7. 86	3, 152, 313	170	23, 600, 000	[11] 33, 523	[11] 197	[11] 3. 96	[11] 780	393, 932	7, 703, 907	6, 660, 939
1956	28, 900. 220	236, 785, 062	8. 19	5, 244, 349	46	24, 000, 000	31, 516	216	4. 25	918	400, 402	8, 354, 230	7, 308, 110
1957	25, 338, 321	227, 753, 802	8. 99	4, 331, 785	1, 138	20, 800, 000	30. 825	196	4. 18	819	292, 307	7, 543, 157	6, 657, 479
1958	21, 171, 142	187, 898, 316	8. 88	2, 279, 859	4, 363	19. 000, 000	26, 540	183	4. 36	798	184, 028	6, 877, 761	5, 332, 043
1959	20, 649, 286	172, 319, 913	8. 35	1, 787, 558	2, 633	18, 800, 000	23, 294	173	5. 12	886	260, 502	7, 096, 343	4, 700, 542

[1] U.S. Department of Commerce.
[2] Before 1913 the figures of consumption take no account of producers' stocks, there being no data available for this item.
[3] Data first collected in 1911.
[4] Data first collected in 1915.
[5] Data first collected in 1929.
[6] As reported by the Commonwealth of Pennsylvania, Department of Mines.
[7] Calculated on basis of Pennsylvania Department of Mines employment data.
[8] Includes some "bootleg" coal purchased by authorized operators and prepared at their breakers.
[9] Output per man calculated on authorized tonnages only; bootleg purchases excluded.
[10] Figures for 1951 and subsequent years are not strictly comparable with previous years. See Production and Employment sections, Coal—Pennsylvania Anthracite, Minerals Yearbook, 1951.
[11] Estimated.

Digitized by Google

SCOPE OF REPORT

The data in this chapter refer only to the anthracite or "hard coal" occurring in 10 counties of northeastern Pennsylvania. Geologically, the anthracite area is divided into four producing fields: The Northern, with 176 square miles underlain by coal measures; the Eastern Middle, with 33 square miles; the Western Middle, with 94; and the Southern, with 181. The area is also divided by the coal trade into three regions: The Wyoming, Lehigh, and Schuylkill. The Wyoming region encompasses the entire Northern field; the Lehigh, the Eastern Middle field and that part of the Southern field lying east of Tamaqua; and the Schuylkill, all of the Western Middle and the remainder of the Southern field. Because of the small tonnage involved, the semianthracite produced in Sullivan County is included for the first time in the Northern field, and Wyoming region.

Production and other data relevant to the anthracitic coals of Arkansas, Colorado, New Mexico, Virginia, and Washington are included in the Bituminous Coal and Lignite chapter of the Minerals Yearbook.

Only a small part of the annual production of Pennsylvania anthracite is consumed without preparation; hence, the Bureau's statistics largely represent the cleaned and sized output of preparation plants and river dredges, expressed in short, or net, tons of 2,000 pounds. The principal questionnaire used by the Bureau is mailed to preparation plants. However, related schedules are sent to operators of underground mines, strip pits, and culm or silt banks to obtain data on run-of-mine production, names of preparation plants to which the raw coal is shipped for preparation, number and type of machines used, and other phases of mining. By using data filed by these producers of raw coal, the Bureau is able to assign tonnages to the county, field and region of origin. By cross-checking each report with those submitted by the preparation plants it is possible to eliminate duplicate reporting and insure complete coverage on the total output. The small percentage (seldom exceeding 2 percent) on which no reports are received is estimated by the Bureau on the basis of data released by the Pennsylvania Department of Mines and Mineral Industries and the Anthracite Committee.

For 1954 and prior years, data on employment in the Pennsylvania anthracite industry were collected as part of the canvass on production. However, beginning with 1956, employment statistics have been compiled from the Bureau of Mines questionnaire, Mine Injuries and Employment—Pennsylvania Anthracite, to reduce the reporting burden of respondents. Bureau employment data, as in the past, include production, development, maintenance, repair, supervisory and technical personnel, and owners or firm members who actually produce coal. Sales personnel, clerical and office staffs, and employees of affiliated companies not producing anthracite are excluded.

Digitized by Google

The distribution data on Pennsylvania anthracite are collected by the Bureau from producers, wholesalers, sales agents, and dock operators. The data cover the 12-month period, April 1–March 31, known as the coal year. This period corresponds more nearly to the heating season than the calendar year. All shipments to final destinations are included, whether made from current production or from stocks. The distribution reports, published as Mineral Market Reports, show rail shipments by sizes to more than 300 cities in the United States and Canada and give State and Provincial totals. The report for the 1958–59 coal year includes, for the first time since the 1944–45 coal year, detailed data on truck shipments to more than 100 cities.

ACKNOWLEDGMENTS

This chapter includes information from numerous sources, as the Bureau's direct mail canvasses of the industry are restricted to the collection of such data as production, employment, mine values, mechanical equipment, injuries, distribution, and retail-dealer stocks and deliveries. Although care has been taken to credit each source individually through the use of textual and tabular footnotes, the Bureau is cognizant of and grateful for the continued cooperation of such organizations as the Pennsylvania Department of Mines and Mineral Industries, the Anthracite Institute, the Anthracite Committee, the Association of American Railroads, the Commonwealth of Massachusetts, the Upper Lake Docks Coal Bureau, Inc., and the Ore and Coal Exchange. Moreover, thanks are due the several hundred anthracite producers who annually submit voluntary reports to the Bureau. Without their cooperation, it would have been impossible to prepare this chapter.

The production and employment data for 1959 were collected and tabulated by Ruth A. Cooper and Kathryn S. Huling, Anthracite Research Center, Schuylkill Haven, Pa., C. S. Kuebler, director.

PRODUCTION, MINING METHODS, AND EQUIPMENT

Production of Pennsylvania anthracite totaled 20.6 million tons in 1959, a decline of 2 percent from 1958.

A noteworthy development was the recovery staged by the smaller industrial sizes after shipments had slumped sharply in 1958 because of depressed business conditions and curtailed industrial activity. Shipments of Buckwheat No. 4 and smaller sizes (used in a wide variety of industrial applications and processes) showed the largest gain—14 percent over 1958. Shipments of Pea and larger (the sizes commonly used in hand-fired equipment) dropped 9 percent owing to continued competition from other fuels and a relatively mild heating season. Shipments of Buckwheat Nos. 1, 2, and 3, large quantities of which are used in mechanical stokers for residential and commercial

Digitized by Google

TABLE 4.—Pennsylvania anthracite shipped in 1959, by regions and sizes

Size	From breakers and washeries								
	Lehigh region			Schuylkill region			Wyoming region [1]		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken	2,932	818	3,750	13,108	560	13,668	5,202		5,202
Egg	29,605	3,273	32,878	52,304	1,679	53,983	49,480	1,747	51,227
Stove	374,269	13,986	388,255	987,462	192,157	1,179,619	1,120,702	43,020	1,163,722
Chestnut	466,679	47,191	513,870	1,130,343	351,020	1,481,363	1,229,594	190,561	1,420,155
Pea	314,912	74,838	389,750	693,153	264,354	957,507	544,092	467,209	1,011,301
Total Pea and larger	1,188,397	140,106	1,328,503	2,876,370	809,770	3,686,140	2,949,070	702,537	3,651,607
Buckwheat No. 1	339,858	53,780	393,638	971,707	251,700	1,223,407	725,822	324,549	1,050,371
Buckwheat No. 2 (Rice)	213,224	97,719	310,943	644,903	224,253	869,156	449,271	192,191	641,462
Buckwheat No. 3 (Barley)	271,768	36,345	308,113	987,991	226,051	1,214,042	656,169	116,562	772,731
Buckwheat No. 4	245,493	7,866	253,359	535,609	72,703	608,312	171,604	3,386	174,990
Buckwheat No. 5	322,006	31,399	353,405	675,682	340,419	1,016,101	132,509	25,709	158,218
Other [3]	128,716	334,370	463,086	355,265	593,375	948,640	206,010	172,298	378,308
Total Buckwheat No. 1 and smaller	1,521,065	561,479	2,082,544	4,171,157	1,708,501	5,879,658	2,341,385	834,695	3,176,080
Grand total	2,709,462	701,585	3,411,047	7,047,527	2,518,271	9,565,798	5,290,455	1,537,232	6,827,687
VALUE									
Lump [2] and Broken	$38,116	$10,189	$48,305	$160,126	$7,172	$167,298	$61,586		$61,586
Egg	357,828	38,791	396,619	589,440	18,495	607,935	554,431	$20,382	574,813
Stove	4,440,916	174,260	4,615,176	10,938,570	2,103,509	13,042,079	12,631,496	540,111	13,171,607
Chestnut	5,585,081	636,026	6,221,107	12,573,644	3,877,353	16,450,997	14,098,342	2,592,146	16,690,488
Pea	3,017,540	905,447	3,922,987	6,282,712	2,468,555	8,751,267	5,313,664	5,659,611	10,973,275
Total Pea and larger	13,439,481	1,764,713	15,204,194	30,544,492	8,475,084	39,019,576	32,659,519	8,812,250	41,471,769
Buckwheat No. 1	$3,032,004	$597,544	$3,629,548	$8,339,576	$2,176,699	$10,516,275	$6,412,155	$3,542,961	$9,955,116
Buckwheat No. 2 (Rice)	1,938,332	1,035,687	2,974,019	5,415,649	1,880,523	7,296,172	4,015,553	1,932,848	5,948,401
Buckwheat No 3 (Barley)	2,039,873	287,052	2,326,925	6,892,206	1,411,131	8,303,337	4,682,653	838,582	5,521,235
Buckwheat No. 4	1,258,685	36,924	1,295,609	2,609,518	311,683	2,921,201	893,809	16,473	910,282

Digitized by Google

Buckwheat No. 5	1,606,293	146,244	1,752,537	2,977,465	1,462,918	4,440,383	628,533	114,908	743,531
Other [3]	453,341	619,493	1,071,834	1,225,184	1,378,913	2,604,097	868,513	468,123	1,336,636
Total Buckwheat No. 1 and smaller	10,327,528	2,722,944	13,050,472	27,459,598	8,621,867	36,081,465	17,501,216	6,913,985	24,415,201
Grand total	23,767,009	4,487,657	28,254,666	58,004,090	17,096,951	75,101,041	50,160,735	15,726,235	65,886,970
AVERAGE VALUE PER TON									
Lump [2] and Broken	$13.00	$12.46	$12.88	$12.22	$12.81	$12.24	$11.84	----------	$11.84
Egg	12.09	11.85	12.06	11.27	11.02	11.26	11.21	$11.67	11.22
Stove	11.87	12.46	11.89	11.08	10.95	11.06	11.27	12.55	11.32
Chestnut	11.97	13.48	12.11	11.12	11.05	11.11	11.47	13.60	11.75
Pea	9.58	12.10	10.07	9.06	9.34	9.14	9.77	12.11	10.85
Total Pea and larger	11.31	12.60	11.44	10.62	10.47	10.59	11.07	12.54	11.36
Buckwheat No. 1	$8.92	$11.11	$9.22	$8.58	$8.65	$8.60	$8.83	$10.92	$9.48
Buckwheat No. 2 (Rice)	9.09	10.60	9.56	8.40	8.39	8.39	8.94	10.06	9.27
Buckwheat No. 3 (Barley)	7.51	7.90	7.55	6.98	6.24	6.84	7.14	7.19	7.15
Buckwheat No. 4	5.13	4.69	5.11	4.87	4.29	4.80	5.21	4.87	5.20
Buckwheat No. 5	4.99	4.66	4.96	4.41	4.30	4.37	4.74	4.47	4.70
Other [3]	3.51	1.85	2.31	3.45	2.32	2.75	4.22	2.72	3.53
Total Buckwheat No. 1 and smaller	6.79	4.85	6.27	6.58	5.05	6.14	7.47	8.28	7.69
Grand total	8.77	6.40	8.28	8.23	6.79	7.85	9.48	10.23	9.65

See footnotes at end of table.

Digitized by Google

TABLE 4.—Pennsylvania anthracite shipped in 1959, by regions and sizes—Continued

Size	Total breakers and washeries			From river dredging			Grand total		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken	21,242	1,378	22,620				21,242	1,378	22,620
Egg	131,389	6,699	138,088				131,389	6,699	138,088
Stove	2,482,433	249,163	2,731,596				2,482,433	249,163	2,731,596
Chestnut	2,826,616	588,772	3,415,388		175	175	2,826,616	588,947	3,415,563
Pea	1,552,157	806,401	2,358,558	200		200	1,552,357	806,401	2,358,758
Total Pea and larger	7,013,837	1,652,413	8,666,250	200	175	375	7,014,037	1,652,588	8,666,625
Buckwheat No. 1	2,037,387	630,029	2,667,416	50	378	428	2,037,437	630,407	2,667,844
Buckwheat No. 2 (Rice)	1,307,398	514,163	1,821,561	200	200	400	1,307,598	514,363	1,821,961
Buckwheat No. 3 (Barley)	1,915,928	378,958	2,294,886	3,224	6,891	10,115	1,919,152	385,849	2,305,001
Buckwheat No. 4	952,706	83,955	1,036,661	79,439	1,638	81,077	1,032,145	85,593	1,117,738
Buckwheat No. 5	1,130,197	397,527	1,527,724	27,868	36,325	64,193	1,158,065	433,852	1,591,917
Other [3]	689,991	1,100,043	1,790,034	553,763	5,818	559,581	1,243,754	1,105,861	2,349,615
Total Buckwheat No. 1 and smaller	8,033,607	3,104,675	11,138,282	664,544	51,250	715,794	8,698,151	3,155,925	11,854,076
Grand total	15,047,444	4,757,088	19,804,532	664,744	51,425	716,169	15,712,188	4,808,513	20,520,701
VALUE									
Lump [2] and Broken	$259,828	$17,361	$277,189				$259,828	$17,361	$277,189
Egg	1,501,699	77,668	1,579,367				1,501,699	77,668	1,579,367
Stove	28,010,982	2,817,880	30,828,862				28,010,982	2,817,880	30,828,862
Chestnut	32,257,067	7,105,525	39,362,592		$1,500	$1,500	32,257,067	7,107,025	39,364,092
Pea	14,613,916	9,033,613	23,647,529	$1,250		1,250	14,615,166	9,033,613	23,648,779
Total Pea and larger	76,643,492	19,052,047	95,695,539	1,250	1,500	2,750	76,644,742	19,053,547	95,698,289
Buckwheat No. 1	17,783,735	6,317,204	24,100,939	200	2,248	2,448	17,783,935	6,319,452	24,103,387
Buckwheat No. 2 (Rice)	11,369,534	4,849,058	16,218,592	1,000	1,200	2,200	11,370,534	4,850,258	16,220,792
Buckwheat No. 3 (Barley)	13,614,732	2,536,765	16,151,497	19,344	32,818	52,162	13,634,076	2,569,583	16,203,659
Buckwheat No. 4	4,762,012	365,080	5,127,092	353,580	6,661	360,241	5,115,592	371,741	5,487,333
Buckwheat No. 5	5,212,291	1,724,160	6,936,451	91,356	156,090	247,446	5,303,647	1,880,250	7,183,897
Other	2,546,038	2,466,529	5,012,567	1,624,176	18,572	1,642,748	4,170,214	2,485,101	6,655,315
Total Buckwheat No. 1 and smaller	55,288,342	18,258,796	73,547,138	2,089,656	217,589	2,307,245	57,377,998	18,476,385	75,854,383
Grand total	131,931,834	37,310,843	169,242,677	2,090,906	219,089	2,309,995	134,022,740	37,529,932	171,552,672

Digitized by Google

AVERAGE VALUE PER TON									
Lump [2] and Broken	$12.23	$12.60	$12.25				$12.23	$12.60	$12.25
Egg	11.43	11.59	11.44				11.43	11.59	11.44
Stove	11.28	11.31	11.29				11.28	11.31	11.29
Chestnut	11.41	12.07	11.53		$8.57	$8.57	11.41	12.07	11.52
Pea	9.42	11.20	10.03	$6.25		6.25	9.41	11.20	10.03
Total Pea and larger	10.93	11.53	11.04	6.25	8.57	7.33	10.93	11.53	11.04
Buckwheat No. 1	8.73	10.03	9.04	4.00	5.95	5.72	8.73	10.02	9.03
Buckwheat No. 2 (Rice)	8.70	9.43	8.90	5.00	6.00	5.50	8.70	9.43	8.90
Buckwheat No. 3 (Barley)	7.11	6.69	7.04	6.00	4.76	5.16	7.10	6.66	7.03
Buckwheat No. 4	5.00	4.35	4.95	4.45	4.07	4.44	4.96	4.34	4.91
Buckwheat No. 5	4.61	4.34	4.54	3.28	4.30	3.85	4.58	4.33	4.51
Other [3]	3.69	2.24	2.80	2.93	3.19	2.94	3.35	2.25	2.83
Total Buckwheat No. 1 and smaller	6.88	5.88	6.60	3.14	4.25	3.22	6.60	5.85	6.40
Grand total	8.77	7.84	8.55	3.15	4.26	3.23	8.53	7.80	8.36

[1] Includes Sullivan County.
[2] Quantity of Lump included is insignificant.
[3] Includes various mixtures of Buckwheat Nos. 2 to 5 and some coal of relatively low dollar value.

Digitized by Google

space heating, declined only 4 percent. Apparently, the decline was small because sales of this type of burning equipment have increased in recent years (see Consumption section of this chapter). Tables 4–7 present data on shipments of anthracite, by sizes and percent of total. Figure 1 shows shipments by regions, 1935–59.

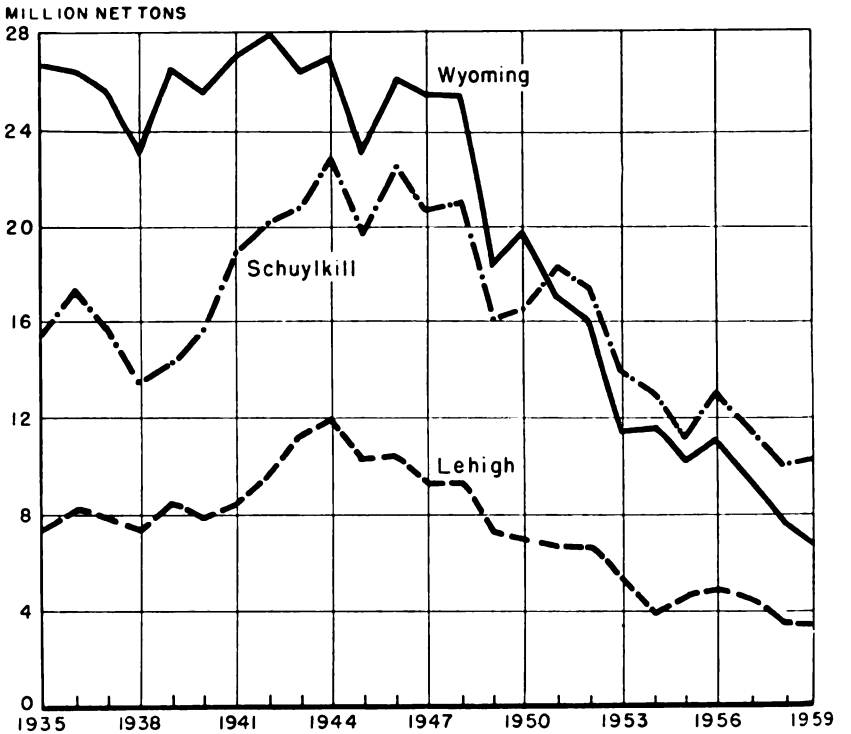

FIGURE 1.—Pennsylvania anthracite shipped from the Lehigh, Schuylkill, and Wyoming regions, 1935–59.

The year's output by regions was as follows: Lehigh, 17 percent (17 percent in 1958); Wyoming, 33 percent (36 percent in 1958); and Schuylkill, 50 percent (47 percent in 1958). On a tonnage basis, output in the Lehigh and Wyoming regions declined 1 and 10 percent, respectively, whereas that in the Schuylkill region increased 3 percent. Of the five largest producing counties, Columbia showed the greatest decline in production, 15 percent, followed by Luzerne with 10 percent. Output remained remarkably steady in Schuylkill County, dropping only a fraction of 1 percent. Among counties showing increases were Northumberland with a gain of 1 percent, Lackawanna, up 2 percent, and several other small producing counties where output substantially exceeded 1958 production. Statistics on production by fields, regions, and counties are presented in tables 8 to 12.

Digitized by Google

TABLE 5.—Sizes of Pennsylvania anthracite shipped to points outside producing region, 1955–59, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments									
	Lehigh region					Schuylkill region				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Lump[1] and Broken	0.2	([2])	([2])	([2])	0.1	0.2	0.1	0.5	0.2	0.2
Egg	1.1	0.9	0.9	1.2	1.1	1.1	1.1	.7	.8	.8
Stove	16.3	13.0	10.8	13.9	13.8	15.3	14.0	12.6	15.1	14.0
Chestnut	17.9	15.7	13.6	17.5	17.3	17.3	16.7	15.0	17.5	16.0
Pea	9.5	7.8	8.2	10.5	11.6	8.6	8.6	8.5	9.2	9.8
Total Pea and larger	45.0	37.4	33.5	43.1	43.9	42.5	40.5	37.3	42.8	40.8
Buckwheat No. 1	11.4	9.8	9.4	12.4	12.5	11.8	12.3	11.9	13.3	13.8
Buckwheat No. 2 (Rice)	7.3	6.0	6.1	8.6	7.9	8.7	8.4	8.5	9.3	9.2
Buckwheat No. 3 (Barley)	9.4	8.6	8.7	11.0	10.0	12.6	13.0	14.2	15.1	14.0
Buckwheat No. 4	8.3	9.7	9.0	9.2	9.1	9.3	7.5	7.7	7.4	7.6
Buckwheat No. 5	5.9	10.0	11.3	12.2	11.9	4.6	9.9	10.0	8.8	9.6
Other	12.7	18.5	22.0	3.5	4.7	10.5	8.4	10.4	3.3	5.0
Total Buckwheat No. 1 and smaller	55.0	62.6	66.5	56.9	56.1	57.5	59.5	62.7	57.2	59.2

Size	Wyoming region[3]					Sullivan County				
Lump[1] and Broken	0.2	0.2	0.1	0.1	0.1	------	------	------	------	[3]
Egg	1.7	1.6	1.5	1.2	.9	------	------	------	------	
Stove	26.6	25.4	22.0	23.4	21.2	------	------	------	6.6	
Chestnut	27.5	28.7	27.0	26.0	23.2	75.0	15.7	26.9	7.8	
Pea	7.5	8.6	9.7	9.7	10.3	------	6.6	27.4	9.5	
Total Pea and larger	63.5	64.5	60.3	60.4	55.7	75.0	22.3	54.3	23.9	[3]
Buckwheat No. 1	11.7	12.1	12.6	13.0	13.7	25.0	------	------	6.1	[3]
Buckwheat No. 2 (Rice)	7.3	7.7	7.9	7.9	8.5	------	50.7	45.7	5.1	
Buckwheat No. 3 (Barley)	9.7	9.2	10.0	10.6	12.4	------	27.0	------	4.8	
Buckwheat No. 4	3.6	3.0	2.6	2.5	3.3	------	------	------	------	
Buckwheat No. 5	.9	.7	1.1	.9	2.5	------	------	------	------	
Other	3.3	2.8	5.5	4.7	3.9	------	------	------	60.1	
Total Buckwheat No. 1 and smaller	36.5	35.5	39.7	39.6	44.3	25.0	77.7	45.7	76.1	[3]

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump[1] and Broken	0.2	0.1	0.3	0.2	[3]	0.2	0.1	0.3	0.2	0.1
Egg	1.4	1.2	1.0	1.0		1.4	1.3	1.0	1.0	.9
Stove	19.8	18.1	15.5	17.8		19.8	18.0	15.5	17.8	16.5
Chestnut	21.3	20.9	18.9	20.5		21.3	20.9	18.9	20.5	18.8
Pea	8.3	8.5	8.9	9.6		8.3	8.5	8.9	9.6	10.3
Total Pea and larger	51.0	48.8	44.6	49.1	[3]	51.0	48.8	44.6	49.1	46.6
Buckwheat No. 1	11.7	11.7	11.7	13.0	[3]	11.7	11.7	11.7	13.0	13.6
Buckwheat No. 2 (Rice)	7.9	7.7	7.8	8.7		7.9	7.7	7.8	8.7	8.7
Buckwheat No. 3 (Barley)	10.9	10.7	11.7	12.8		10.9	10.7	11.7	12.8	12.7
Buckwheat No. 4	6.9	6.3	6.1	6.0		6.9	6.3	6.1	6.0	6.3
Buckwheat No. 5	3.4	6.5	7.1	6.6		3.4	6.5	7.1	6.6	7.5
Other	8.2	8.3	11.0	3.8		8.2	8.3	11.0	3.8	4.6
Total Buckwheat No. 1 and smaller	49.0	51.2	55.4	50.9	[3]	49.0	51.2	55.4	50.9	53.4

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.
[3] Sullivan County included with Wyoming region in 1959.

Digitized by Google

TABLE 6.—Sizes of Pennsylvania anthracite shipped to points inside producing region, 1955–59, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments									
	Lehigh region					Schuylkill region				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Lump [1] and Broken	------	------	------	------	0.1	(2)	0.1	(2)	(2)	(2)
Egg	(2)	0.1	0.4	0.3	.5	0.1	.2	0.1	0.1	0.1
Stove	1.4	1.3	2.5	2.3	2.0	13.4	10.7	10.2	8.5	7.6
Chestnut	15.3	17.2	15.8	9.9	6.7	22.4	22.4	20.1	15.6	14.0
Pea	29.6	30.8	29.2	16.9	10.7	18.7	19.4	17.0	12.2	10.5
Total Pea and larger	46.3	49.4	47.9	29.4	20.0	54.6	52.8	47.4	36.4	32.2
Buckwheat No. 1	13.3	15.2	16.4	10.9	7.7	14.5	15.9	14.9	11.7	10.0
Buckwheat No. 2 (Rice)	20.9	25.0	27.2	17.3	13.9	11.2	13.6	12.9	10.1	8.9
Buckwheat No. 3 (Barley)	5.5	6.3	7.4	5.5	5.2	12.8	11.5	14.5	9.4	9.0
Buckwheat No. 4	1.8	.4	.2	.3	1.1	5.7	1.8	3.9	3.1	2.9
Buckwheat No. 5	------	------	.9	1.7	4.5	.7	.9	1.8	2.1	13.5
Other	12.2	3.7	------	[3] 34.9	47.6	.5	3.5	4.6	[3] 27.2	23.5
Total Buckwheat No. 1 and smaller	53.7	50.6	52.1	[3] 70.6	80.0	45.4	47.2	52.6	[3] 63.6	67.8

Size	Wyoming region [4]					Sullivan County				
Lump [1] and Broken	1.9	1.9	1.0	------	------	------	------	------	------	(4)
Egg	.3	.2	.1	0.1	0.1	------	------	------	------	
Stove	2.5	1.9	2.3	2.5	2.8	------	------	------	------	
Chestnut	13.0	12.1	12.0	12.0	12.4	14.3	43.2	38.1	14.9	
Pea	32.9	31.0	31.1	30.1	30.4	17.0	27.5	25.2	12.7	
Total Pea and larger	50.6	47.1	46.5	44.7	45.7	31.3	70.7	63.3	27.6	(4)
Buckwheat No. 1	18.2	18.1	19.3	20.2	21.1	20.1	------	------	14.1	(4)
Buckwheat No. 2 (Rice)	12.2	11.0	11.7	11.9	12.5	48.6	12.6	36.7	------	
Buckwheat No. 3 (Barley)	10.6	11.0	9.6	9.5	7.6	------	16.7	------	------	
Buckwheat No. 4	1.4	------	.3	.2	.2	------	------	------	------	
Buckwheat No. 5	------	5.6	5.4	2.5	1.7	------	------	------	------	
Other	7.0	7.2	7.2	11.0	11.2	------	------	------	58.3	
Total Buckwheat No. 1 and smaller	49.4	52.9	53.5	55.3	54.3	68.7	29.3	36.7	72.4	(4)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [1] and Broken	1.0	1.0	0.5	(2)	(4)	1.0	1.0	0.5	(2)	(2)
Egg	.2	.1	.1	0.1		.2	.2	.2	0.1	0.1
Stove	6.4	5.5	5.8	5.3		6.3	5.5	5.8	5.3	5.2
Chestnut	16.6	16.8	15.8	13.4		16.7	16.8	15.8	13.4	12.4
Pea	27.4	26.2	24.8	20.2		27.4	26.2	24.8	20.2	17.0
Total Pea and larger	51.6	49.6	47.0	39.0	(4)	51.6	49.7	47.1	39.0	34.7
Buckwheat No. 1	16.4	17.0	17.1	15.1	(4)	16.4	17.0	17.1	15.1	13.2
Buckwheat No. 2 (Rice)	12.7	13.1	13.5	11.7		12.8	13.1	13.6	11.7	10.8
Buckwheat No. 3 (Barley)	10.8	10.8	11.6	9.0		10.8	10.8	11.5	9.0	8.0
Buckwheat No. 4	3.0	.8	1.8	1.5		3.0	.8	1.8	1.5	1.8
Buckwheat No. 5	.3	3.3	3.5	2.3		.2	3.2	3.4	2.2	8.4
Other	5.2	5.4	5.5	[3] 21.4		5.2	5.4	5.5	[3] 21.5	23.1
Total Buckwheat No. 1 and smaller	48.4	50.4	53.0	[3] 61.0	(4)	48.4	50.3	52.9	[3] 61.0	65.3

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.
[3] An undetermined part of "Other" sizes included in "Local sales" in 1958 was reported as shipped "Outside region" in 1957.
[4] Sullivan County included with Wyoming region in 1959.

Digitized by Google

TABLE 7.—Sizes of Pennsylvania anthracite shipped to points outside and inside producing region in 1959, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments					
	Lehigh region			Schuylkill region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken	0.1	0.1	0.1	0.2	(2)	0.1
Egg	1.1	.5	.9	.8	0.1	.6
Stove	13.8	2.0	11.4	14.0	7.6	12.3
Chestnut	17.3	6.7	15.1	16.0	14.0	15.5
Pea	11.6	10.7	11.4	9.8	10.5	10.0
Total Pea and larger	43.9	20.0	38.9	40.8	32.2	38.5
Buckwheat No. 1	12.5	7.7	11.6	13.8	10.0	12.8
Buckwheat No. 2 (Rice)	7.9	13.9	9.1	9.2	8.9	9.1
Buckwheat No. 3 (Barley)	10.0	5.2	9.0	14.0	9.0	12.7
Buckwheat No. 4	9.1	1.1	7.4	7.6	2.9	6.4
Buckwheat No. 5	11.9	4.5	10.4	9.6	13.5	10.6
Other	4.7	47.6	13.6	5.0	23.5	9.9
Total Buckwheat No. 1 and smaller	56.1	80.0	61.1	59.2	67.8	61.5

Size	Wyoming region [3]			Total		
Lump [1] and Broken	0.1		0.1	0.1	(2)	0.1
Egg	.9	0.1	.8	.9	0.1	.7
Stove	21.2	2.8	17.0	16.5	5.2	13.8
Chestnut	23.2	12.4	20.8	18.8	12.4	17.3
Pea	10.3	30.4	14.8	10.3	17.0	11.9
Total Pea and larger	55.7	45.7	53.5	46.6	34.7	43.8
Buckwheat No. 1	13.7	21.1	15.4	13.6	13.2	13.5
Buckwheat No. 2 (Rice)	8.5	12.5	9.4	8.7	10.8	9.2
Buckwheat No. 3 (Barley)	12.4	7.6	11.3	12.7	8.0	11.6
Buckwheat No. 4	3.3	.2	2.6	6.3	1.8	5.2
Buckwheat No. 5	2.5	1.7	2.3	7.5	8.4	7.7
Other	3.9	11.2	5.5	4.6	23.1	9.0
Total Buckwheat No. 1 and smaller	44.3	54.3	46.5	53.4	65.3	56.2

[1] Quantity of lump included is insignificant. [2] Less than 0.05 percent. [3] Includes Sullivan County

TABLE 8.—Pennsylvania anthracite produced, 1955–59, by fields, in net tons

Field	1955	1956	1957	1958	1959
Eastern Middle: Breakers and washeries	2,409,794	2,391,906	2,404,609	1,738,555	1,915,788
Western Middle:					
Breakers and washeries	6,527,929	7,268,150	6,930,428	5,982,747	5,813,868
Dredges	52,169	46,348	38,497	68,986	65,683
Total Western Middle	6,580,098	7,314,498	6,968,925	6,051,733	5,879,551
Southern:					
Breakers and washeries	5,958,776	7,425,427	6,061,879	5,086,583	5,269,930
Dredges	712,724	625,310	594,941	610,668	650,936
Total Southern	6,671,500	8,050,737	6,656,820	5,697,251	5,920,866
Northern:					
Breakers and washeries [1]	10,519,212	11,098,450	9,283,704	7,671,464	6,933,081
Dredges	23,950	44,629	24,263	12,139	----------
Total Northern	10,543,162	11,143,079	9,307,967	7,683,603	6,933,081
Total:					
Breakers and washeries	25,415,711	28,183,933	24,680,620	20,479,349	19,932,667
Dredges	788,843	716,287	657,701	691,793	716,619
Grand total	26,204,554	28,900,220	25,338,321	21,171,142	20,649,286

[1] Includes Sullivan County.

Digitized by Google

TABLE 9.—Pennsylvania anthracite shipped outside producing region, sold locally, and used as colliery fuel in 1959, by regions

Region	Shipments outside region		Local sales		Colliery fuel		Total	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Lehigh:								
Breakers and washeries	2,709,462	$23,767,009	701,585	$4,487,657	10,557	$80,285	3,421,604	$28,334,951
Dredges	13,312	56,048					13,312	56,048
Total Lehigh	2,722,774	23,823,057	701,585	4,487,657	10,557	80,285	3,434,916	28,390,999
Schuylkill:								
Breakers and washeries	7,047,527	58,004,090	2,518,271	17,096,951	12,184	94,013	9,577,982	75,195,054
Dredges	651,432	2,034,858	51,425	219,089	450	900	703,307	2,254,847
Total Schuylkill	7,698,959	60,038,948	2,569,696	17,316,040	12,634	94,913	10,281,289	77,449,901
Wyoming: Breakers and washeries [2]	5,290,455	50,160,735	1,537,232	15,726,235	105,394	592,043	6,933,081	66,479,013
Total:								
Breakers and washeries	15,047,444	131,931,834	4,757,088	37,310,843	128,135	766,341	19,932,667	170,009,018
Dredges	664,744	2,090,906	51,425	219,089	450	900	716,619	2,310,895
Grand total:								
1959	15,712,188	134,022,740	4,808,513	37,529,932	128,585	767,241	20,649,286	172,319,913
1958	16,129,545	145,411,735	4,846,646	41,253,030	194,951	1,233,551	21,171,142	187,898,316
Change, percent	−2.6	−7.8	−0.8	−9.0	−34.0	−37.8	−2.5	−8.3

[1] Value given for shipments is value at which coal left possession of producing region; does not include margins of separately incorporated sales companies.
[2] Includes Sullivan County.

Digitized by Google

TABLE 10.—Pennsylvania anthracite produced in 1959, classified as fresh-mined, culm-bank, and river coal, by regions, in net tons

Region	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Lehigh	212,932	705,556	1,671,862	831,254	13,312	3,434,916
Schuylkill	646,966	3,389,533	3,636,018	1,905,465	703,307	10,281,289
Wyoming [1]	3,840,644	619,839	1,788,463	684,135	----------	6,933,081
Total	4,700,542	4,714,928	7,096,343	3,420,854	716,619	20,649,286

[1] Includes Sullivan County.

TABLE 11.—Pennsylvania anthracite produced in 1959, classified as fresh-mined, culm-bank, and river coal, by fields, in net tons

Field	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Eastern Middle	167,358	51,846	935,664	760,920	----------	1,915,788
Western Middle	303,020	1,910,441	2,264,935	1,335,472	65,683	5,879,551
Southern	389,520	2,132,802	2,107,281	640,327	650,936	5,920,866
Northern [1]	3,840,644	619,839	1,788,463	684,135	----------	6,933,081
Total	4,700,542	4,714,928	7,096,343	3,420,854	716,619	20,649,286

[1] Includes Sullivan County.

TABLE 12.—Pennsylvania anthracite produced in 1959, by counties

County	Shipments outside producing regions		Sold to local trade		Colliery fuel		Total production	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Carbon	257,363	$2,275,939	----------	----------	----------	----------	257,363	$2,275,939
Columbia	607,286	5,774,707	47,282	$415,691	1,955	$14,019	656,523	6,204,417
Dauphin	200,420	695,823	30,246	166,944	----------	----------	230,666	862,767
Lackawanna	1,550,215	13,577,503	507,146	5,766,360	55,673	270,967	2,113,034	19,614,830
Lancaster, Lebanon, Northampton, and Snyder [2]	611,599	1,876,973	14,093	65,516	----------	----------	625,692	1,942,489
Luzerne	4,733,179	44,934,623	1,367,350	12,215,126	57,389	377,540	6,157,918	57,527,289
Northumberland	1,678,841	13,234,455	980,983	5,798,233	3,633	20,040	2,663,457	19,052,728
Schuylkill	6,064,893	51,578,922	1,855,348	13,035,396	9,925	84,575	7,930,166	64,698,893
Sullivan	7,507	62,768	1,843	18,443	10	100	9,360	81,311
Wayne	885	11,027	4,222	48,223	----------	----------	5,107	59,250
Total	15,712,188	134,022,740	4,808,513	37,529,932	128,585	767,241	20,649,286	172,319,913

[1] Value given is value at which coal left possession of producing company; does not include margins of separately incorporated sales companies.
[2] Counties producing dredge coal only.

Digitized by Google

Underground Mines.—Underground mining was the only source of Pennsylvania anthracite to show a decrease, the year's total falling 12 percent below 1958. As a result, underground production was only 46 percent of the output from all sources, compared with 51 percent in 1958. The decline in production at underground mines continued the trend begun several years previously when producers began obtaining a greater proportion of their coal requirements from strip pits and culm banks. The mine disaster near Pittston, Pa. (Northern field, Wyoming region) and the subsequent closing of several operations in the area because of flooding also were important factors in the decreased output from underground mines.

As in 1958, the decline in underground production in the Schuylkill region was less than in the Lehigh and Wyoming regions, the Schuylkill showing a decrease of only 5 percent and the latter, 22 and 16 percent, respectively. Consequently, of all coal produced underground in 1959, the Schuylkill region accounted for 43 percent compared with 40 percent in 1958. The Lehigh region contributed 10 percent of the underground total (11 percent in 1958) and the Wyoming, 47 percent (49 percent in 1958). Tables 8 to 11 give details on production by source, fields, and regions. Trends in the production of anthracite, 1949–59, by source, are shown in figure 2.

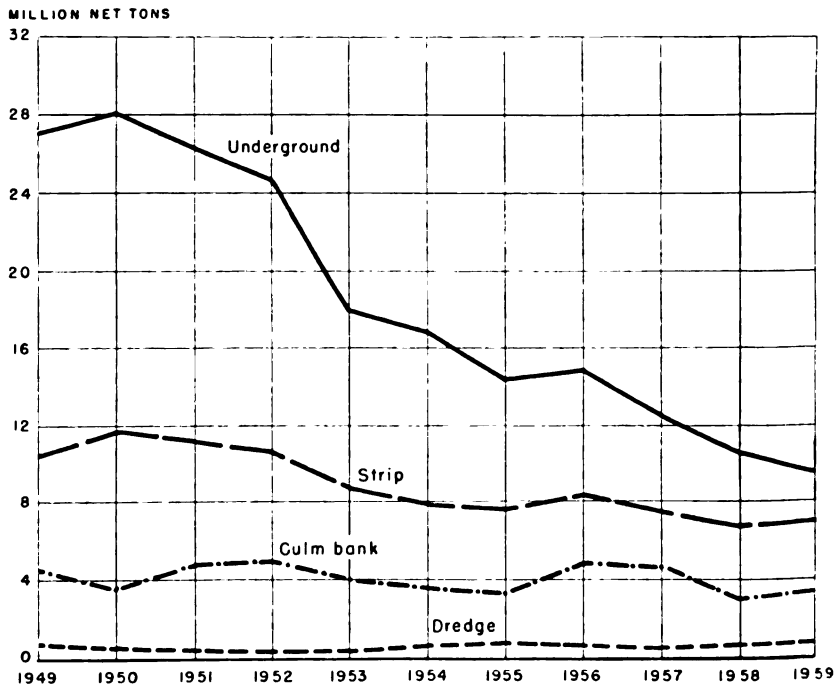

FIGURE 2.—Production of Pennsylvania anthracite, by sources, 1949–59.

Digitized by Google

Strip Pits.—During 1959, 7.1 million tons of Pennsylvania anthracite was produced at strip or opencut mines, a gain of 219,000 tons (3 percent) over 1958. Because of the relatively sharp drop in underground output, this gain increased the percentage obtained at strip pits to 34 percent of total production, compared with 32 percent in 1958. Of the total fresh-mined coal (underground and strip), strip pits accounted for proportionately more of the 1959 production in each of the three regions. For example, 65 percent of the Lehigh region's 1959 output (59 percent in 1958) was obtained from stripping operations, 47 percent of the Schuylkill's (44 percent in 1958), and 29 percent of the Wyoming's (26 percent in 1958).

The Schuylkill region with 51 percent of the total, again led in strip production, followed by the Wyoming region with 25 percent and the Lehigh with 24 percent. Output at strip pits increased only slightly in the Lehigh region, rose 7 percent in the Schuylkill, and declined 2 percent in the Wyoming. Table 13 shows detailed data on strip-pit production for selected years, 1915–59, and figure 3 shows trends in anthracite stripping by regions, 1935–59.

Culm-Bank Coal.—As a result of the stronger demand for the smaller sizes of anthracite in 1959, output from culm and silt banks increased 18 percent. Of the reported total (3.4 million tons), 56 percent originated in the Schuylkill region, 24 percent in the Lehigh

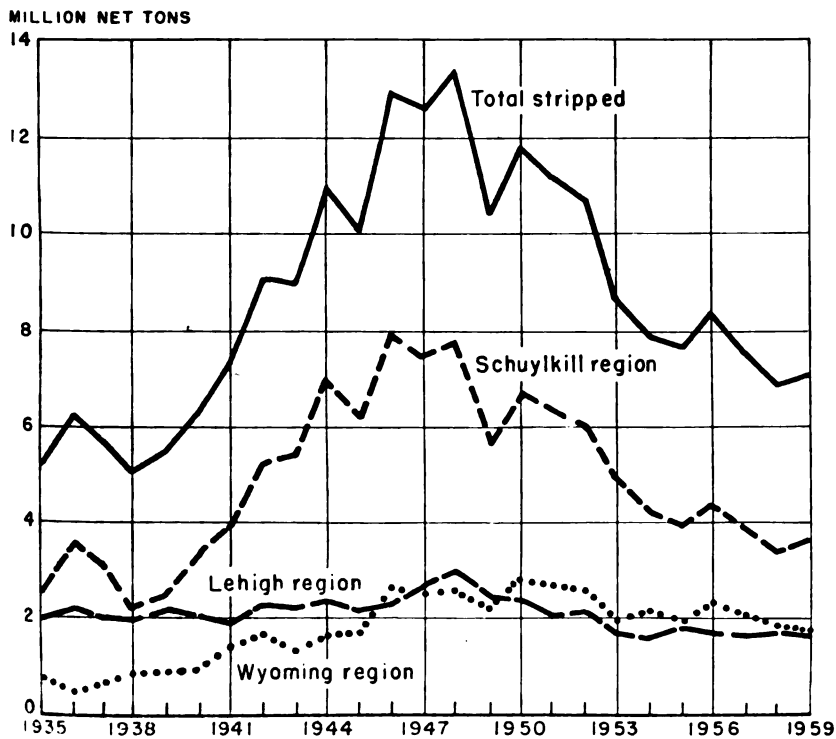

FIGURE 3.—Pennsylvania anthracite mined from strip pits by regions, 1935–59.

Digitized by Google

region, and 20 percent in the Wyoming. The Lehigh region recorded the largest gain (37 percent), followed by the Wyoming with an increase of 23 percent and the Schuylkill with a gain of 9 percent. Tables 10, 11, and 14 show production of Pennsylvania anthracite from culm banks, by fields and regions.

TABLE 13.—Production of Pennsylvania anthracite from strip pits, 1915, 1920, 1925, 1930, and 1952–59

	Mined by stripping (net tons)	Percent of fresh-mined total that was stripped	Number of men employed	Average number of days worked
1915	1,121,603	(1)	(1)	(1)
1920	2,054,441	2.5	(1)	(1)
1925	1,578,478	2.7	(1)	(1)
1930	2,536,288	3.8	(1)	(1)
1952	10,696,705	30.2	7,100	212
1953	8,606,482	32.5	6,168	193
1954	7,939,680	32.0	4,837	202
1955	7,703,907	34.7	[2] 4,642	[2] 205
1956	8,354,230	35.7	4,840	216
1957	7,543,157	37.4	4,546	207
1958	6,877,761	39.1	4,418	196
1959:				
Lehigh region	1,671,862	64.5	939	213
Schuylkill region	3,636,018	47.4	1,920	194
Wyoming region [3]	1,788,463	28.6	916	199
Total	7,096,343	43.0	3,775	200

[1] Data not available.
[2] Estimated.
[3] Includes Sullivan County.

TABLE 14.—Production of Pennsylvania anthracite from culm banks, by regions, 1935–59, in net tons

Year	Lehigh	Schuylkill	Wyoming	Sullivan County	Total
1935	192,790	1,748,960	760,718	----------	2,702,468
1936	136,058	2,532,116	525,798	----------	3,193,972
1937	101,239	2,178,482	442,878	----------	2,722,599
1938	53,037	1,941,896	345,511	----------	2,340,444
1939	64,180	2,159,548	360,086	----------	2,583,814
1940	192,878	2,109,557	480,603	----------	2,783,038
1941	326,755	2,881,049	449,062	----------	3,656,866
1942	745,934	3,529,757	459,373	----------	4,735,064
1943	1,944,047	4,577,917	1,041,841	19,893	7,583,698
1944	2,125,317	5,787,036	1,673,994	13,833	9,600,180
1945	2,086,864	4,936,907	1,728,440	34,448	8,786,659
1946	1,875,590	4,752,141	1,780,874	22,487	8,431,092
1947	1,044,501	3,947,016	1,409,217	2,912	6,403,646
1948	796,114	3,729,542	1,098,123	----------	5,623,779
1949	694,763	2,778,131	956,250	----------	4,429,144
1950	366,069	2,533,535	565,829	1,877	3,467,310
1951	566,613	3,578,795	484,792	----------	4,630,200
1952	791,445	3,407,974	566,097	----------	4,765,516
1953	714,646	2,792,323	504,031	----------	4,011,000
1954	797,761	2,320,006	447,715	----------	3,565,482
1955	862,539	1,934,492	416,015	----------	3,213,046
1956	1,493,381	2,750,838	530,580	----------	4,774,799
1957	1,457,869	2,479,241	584,300	----------	4,521,410
1958	605,741	1,742,356	550,756	3,900	2,902,753
1959	831,254	1,905,465	[1] 684,135	(1)	3,420,854

[1] Sullivan County included in Wyoming region.

Digitized by Google

Dredge Coal.—The relatively strong demand for the smaller sizes of anthracite also was reflected in the production of dredge, or river, coal. In 1959, river operations reported an output of 717,000 tons of the small sizes, 4 percent above 1958. The Susquehanna River was again the principal source, supplying 690,000 tons. The Lehigh River contributed 14,000 tons and the Schuylkill 13,000 tons. Tables 15 and 16 give detailed data on the production and value of river coal. The average values shown are not comparable for certain years. For instance, one company, which usually produces the bulk of the tonnage, reported cost of production for 1956–58, whereas data reported for 1959 and years prior to 1956 apparently represented a fair market price.

TABLE 15.—Pennsylvania anthracite produced by dredges in 1959, by rivers (including tributaries)

River	Production (net tons)	Value	
		Total	Average
Lehigh	13,312	$56,048	$4.21
Schuylkill	13,213	61,427	4.65
Susquehanna	690,094	2,193,420	3.18
Total	716,619	2,310,895	3.22

TABLE 16.—Pennsylvania anthracite produced by dredges, 1935–59, by rivers (including tributaries)

Year	Net tons				Value	
	Lehigh River	Schuylkill River	Susquehanna River	Total	Total	Average per ton
1935	78,578	73,326	438,563	590,467	$517,304	$.88
1936	63,327	31,669	451,688	546,684	581,679	1.06
1937	[1] 95,065	(1)	665,409	760,474	842,052	1.11
1938	[1] 123,452	(1)	447,572	571,024	570,579	1.00
1939	62,134	67,539	574,187	703,860	746,000	1.06
1940	[1] 78,947	(1)	863,997	942,944	1,097,000	1.16
1941	47,838	396,522	1,073,203	1,517,563	1,839,784	1.21
1942	9,385	268,919	1,006,729	1,285,033	1,478,719	1.15
1943	37,452	342,815	954,470	1,334,737	1,972,777	1.48
1944	40,894	494,371	837,472	1,372,737	2,084,431	1.52
1945	41,409	366,161	797,656	1,205,226	1,924,148	1.60
1946	37,441	247,757	847,196	1,132,394	2,091,324	1.85
1947	46,478	158,102	1,015,126	1,219,706	2,480,068	2.03
1948	54,284	67,871	865,849	988,004	2,291,752	2.32
1949	22,131	52,012	790,979	865,122	2,131,096	2.46
1950	21,877	34,222	563,465	619,564	1,677,508	2.71
1951	25,344	27,454	508,770	561,568	1,576,576	2.81
1952	17,402	30,407	324,245	372,054	1,109,778	2.98
1953	31,391	20,643	386,147	438,181	1,449,149	3.31
1954	16,015	----------	709,892	725,907	1,810,026	2.49
1955	29,935	60,256	698,652	788,843	1,844,835	2.34
1956	44,262	5,540	666,485	716,287	1,273,415	1.78
1957	30,650	10,167	616,884	657,701	1,143,152	1.74
1958	30,763	10,230	650,800	691,793	1,324,943	1.92
1959	13,312	13,213	690,094	716,619	2,310,895	3.22

[1] Schuylkill included with Lehigh in 1937, 1938, and 1940.

Digitized by Google

Weekly and Monthly Data.—Bureau of Mines estimates of weekly and monthly production of Pennsylvania anthracite are published in Weekly Anthracite Reports, copies of which may be obtained by writing to the Bureau of Mines, Washington 25, D.C. These estimates are based on statistical factors computed from carloading data furnished by the Association of American Railroads, statistics on trucked coal compiled monthly by the Pennsylvania Department of Mines and Mineral Industries, and annual data on river coal and colliery fuel. These estimates are later adjusted to the total obtained by the annual production canvass. (See tables 17 and 18.) Supplements to the Weekly Anthracite Reports also include salient monthly statistics on other aspects of the industry such as rail and truck shipments, Lake-dock activities, imports, exports, producer and retail-dealer stocks, retail deliveries, consumption by public utilities and railroads, wholesale price indexes, average earnings, and working time.

TABLE 17.—Estimated weekly production of Pennsylvania anthracite in 1959[1]

Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons
Jan. 3	[2] 104	Apr. 11	355	July 18	374	Oct. 24	457
10	577	18	383	25	370	31	390
17	620	25	378	Aug. 1	382	Nov. 7	447
24	467	May 2	349	8	389	14	463
31	550	9	336	15	360	21	409
Feb. 7	397	16	342	22	372	28	445
14	387	23	338	29	366	Dec. 5	471
21	412	30	380	Sept. 5	451	12	446
28	449	June 6	401	12	348	19	460
Mar. 7	400	13	431	19	400	26	349
14	351	20	423	26	446	31	[2] 338
21	381	27	496	Oct. 3	457		
28	327	July 4	61	10	397	Total	20,649
Apr. 4	325	11	47	17	386		

[1] Estimated from weekly carloadings as reported by the Association of American Railroads; adjusted to annual production total from Bureau of Mines canvass.
[2] Figures represent output of working days in that part of week included in calendar year 1959. Preliminary production for week of Jan. 2, 1960, was 33,000 tons. Revised total for week of Jan. 3, 1959, was 387,000 tons.

TABLE 18.—Estimated monthly production of Pennsylvania anthracite, 1952–59, in thousand net tons[1]

Month	1952	1953	1954	1955	1956	1957	1958	1959
January	4,221	2,707	2,874	2,454	2,743	2,625	2,161	2,318
February	3,362	2,438	2,525	2,568	2,360	2,072	1,753	1,645
March	3,140	2,354	2,364	2,097	2,052	1,798	1,476	1,593
April	3,384	2,048	2,100	1,723	2,258	2,037	1,545	1,588
May	3,400	2,869	2,013	1,985	1,947	2,294	1,612	1,466
June	3,293	2,975	2,387	2,130	2,470	2,551	1,963	1,777
July	2,522	2,551	2,080	1,845	1,890	1,478	1,377	1,206
August	2,704	2,452	2,270	1,904	2,729	2,294	1,750	1,650
September	3,761	2,732	2,416	2,453	2,509	2,173	2,050	1,823
October	4,213	2,994	2,353	2,244	2,971	2,262	1,966	1,805
November	3,405	2,586	2,681	2,385	2,629	1,928	1,559	1,853
December	3,178	2,443	3,020	2,507	2,342	1,826	1,959	1,965
Total	40,583	30,949	29,083	26,205	28,900	25,338	21,171	20,649

[1] Production is estimated from weekly carloadings as reported by the Association of American Railroads and includes mine fuel, coal sold locally, and dredge coal.

Digitized by Google

Mechanical Loading.—The percentage of coal loaded mechanically underground remained virtually the same as in 1958, slightly below 50 percent of the total underground production. Owing to the abrupt decline in underground output, however, the tonnages loaded by hand and by mechanical means each fell 12 percent. The decline in the tonnage loaded mechanically and the previously mentioned mine disaster resulted in a 30 percent decrease in the number of loading units reported in use.

Of the tonnage mechanically loaded underground in 1959, 82 percent was produced in the Northern field, where the coal seams are relatively flatter and more amenable to mechanization, 8 percent in the Southern, 6 percent in the Western Middle, and 4 percent in the Eastern Middle field. Compared with 1958, the Eastern Middle field showed the greatest decline in tonnage loaded mechanically (15 percent). In the Northern field the decrease was 13 percent and in the Southern, 7 percent. In the Western Middle the total loaded mechanically gained 7 percent. Detailed statistics on mechanical loading and equipment are presented in tables 19–21. Figure 4 shows trends in mechanical loading, hand loading, and stripping, 1935–59.

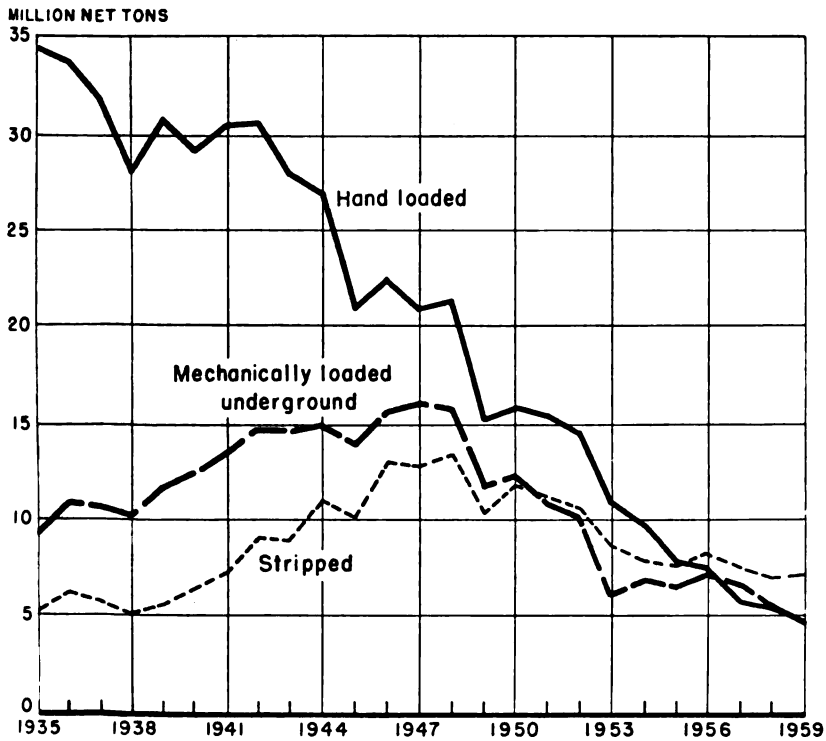

FIGURE 4.—Pennsylvania anthracite mechanically loaded, hand loaded, and stripped, 1935–59.

Digitized by Google

TABLE 19.—Pennsylvania anthracite loaded mechanically underground, 1958–59, by fields, in net tons

Field	Scraper loaders[1]		Pit-car loaders		Hand-loaded face conveyors, all types[2]		Total mechanically loaded	
	1958	1959	1958	1959	1958	1959	1958	1959
Northern	1,249,470	1,216,419	40,189	16,501	3,144,497	2,607,724	4,434,156	3,840,644
Eastern Middle	59,101	80,764	----	----	137,401	86,594	196,502	167,358
Western Middle	113,950	56,048	----	----	168,375	246,972	282,325	303,020
Southern	167,341	110,542	2,972	3,000	248,747	275,978	419,060	389,520
Total	1,589,862	1,463,773	43,161	19,501	3,699,020	3,217,268	5,332,043	4,700,542

[1] Includes mobile loaders.
[2] Shaker chutes, including those equipped with duckbills.

TABLE 20.—Pennsylvania anthracite loaded mechanically underground, 1955–59

Year	Scraper loaders		Mobile loaders		Conveyors[1] and pit-car loaders		Total loaded mechanically	
	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded
1955	279	761,945	79	582,526	1,940	5,316,468	2,298	6,660,939
1956	303	1,080,339	80	1,077,412	1,593	5,150,359	1,976	7,308,110
1957	295	1,179,099	66	709,493	1,437	4,678,887	1,798	6,657,479
1958	290	931,313	51	658,549	1,234	3,742,181	1,575	5,332,043
1959	186	771,142	46	692,631	869	3,236,769	1,101	4,700,542

[1] Includes duckbills and other self-loading conveyors.

Cutting Machines.—Owing to the difficulties involved in cutting the thick, steeply pitching seams of Pennsylvania anthracite, most of the coal produced underground is shot from the solid face. Only five undercutting machines were reported in use in 1959—one less than in 1958—and only 261,000 tons was reported undercut before being shot. Since 1956 all undercutting has been confined to the Wyoming region.

Power Equipment.—Despite the increase in production at strip pits and culm-bank operations, 23 less draglines and power shovels were reported in use in 1959. Of the total decrease, 11 were power shovels and 12 draglines. At strip pits, 143 shovels were reported in use—the same as in 1958—but the number of draglines decreased from 213 to 206. In culm-bank recovery work, 27 shovels and 31 draglines were reported used, a decline of 8 shovels and an increase of 1 dragline. Two shovels and four draglines were used at both types of operations. Table 22 gives detailed data on power equipment used in the anthracite industry, 1957–59.

Digitized by Google

TABLE 21.—Trends in mechanical loading, hand loading, and stripping of Pennsylvania anthracite, 1927–59

(Mechanical loading includes coal handled on pit-car loaders and hand-loaded face conveyors)

Year	Fresh mined coal							
	Underground					From strip pits		Total
	Mechanical loading (net tons)	Percent of total underground	Hand loading (net tons)	Percent of total underground	Total (net tons)	Net tons	Percent of total fresh mined	
1927	[1] 2,223,281	3.0	71,434,537	97.0	73,657,818	2,153,156	2.8	75,810,974
1928	[1] 2,351,074	3.4	67,373,788	96.6	69,724,862	2,422,924	3.4	72,147,786
1929	3,470,158	5.0	66,493,690	95.0	69,963,848	1,911,766	2.7	71,875,614
1930	4,467,750	6.9	60,458,344	93.1	64,926,094	2,536,288	3.8	67,462,382
1931	4,384,780	8.2	49,074,722	91.8	53,459,502	3,813,237	6.7	57,272,739
1932	5,433,340	12.4	38,400,820	87.6	43,834,160	3,980,973	8.3	47,815,133
1933	6,557,267	16.0	34,474,844	84.0	41,032,111	4,932,069	10.7	45,964,180
1934	9,284,486	19.1	39,290,255	80.9	48,574,741	5,798,138	10.7	54,372,879
1935	9,279,057	21.2	34,503,819	78.8	43,782,876	5,187,072	10.6	48,969,948
1936	10,827,946	24.2	33,898,560	75.8	44,726,506	6,203,267	12.2	50,929,773
1937	10,683,837	25.1	31,882,514	74.9	42,566,351	5,696,018	11.8	48,262,369
1938	10,151,669	26.6	27,990,628	73.4	38,142,297	5,095,341	11.8	43,237,638
1939	11,773,833	27.7	30,797,715	72.3	42,571,548	5,486,479	11.4	48,058,027
1940	12,326,000	29.7	29,190,837	70.3	41,516,837	6,352,700	13.3	47,869,537
1941	13,441,987	30.6	30,435,277	69.4	43,877,264	7,316,574	14.3	51,193,838
1942	14,741,459	32.6	30,495,240	67.4	45,236,699	9,070,933	16.7	54,307,632
1943	14,745,793	34.5	27,990,005	65.5	42,735,798	8,989,387	17.4	51,725,185
1944	14,975,146	35.8	26,800,270	64.2	41,775,416	10,953,030	20.8	52,728,446
1945	13,927,955	39.9	20,957,744	60.1	34,885,699	10,056,325	22.4	44,942,024
1946	15,619,162	41.0	22,465,295	59.0	38,084,457	12,858,930	25.2	50,943,387
1947	16,064,011	43.4	20,909,101	56.6	36,963,112	12,603,545	25.4	49,566,657
1948	15,742,368	42.3	21,432,923	57.7	37,175,291	13,352,874	26.4	50,528,165
1949	11,858,088	43.9	15,172,562	56.1	27,030,650	10,376,808	27.7	37,407,458
1950	12,335,650	43.8	15,820,245	56.2	28,155,895	11,833,034	29.6	39,989,829
1951	10,847,787	41.2	15,494,452	58.8	26,342,239	11,135,990	29.7	37,478,229
1952	10,034,464	40.5	14,713,819	59.5	24,748,283	10,696,705	30.2	35,444,988
1953	6,838,769	38.2	11,054,720	61.8	17,893,489	8,606,482	32.5	26,499,971
1954	6,978,035	41.4	9,874,373	58.6	16,852,408	7,939,680	32.0	24,792,088
1955	6,660,939	45.9	7,837,819	54.1	14,498,758	7,703,907	34.7	22,202,665
1956	7,308,110	48.5	7,746,794	51.5	15,054,904	8,354,230	35.7	23,409,134
1957	6,657,479	52.8	5,958,574	47.2	12,616,053	7,543,157	37.4	20,159,210
1958	5,332,043	49.8	5,366,792	50.2	10,698,835	6,877,761	39.1	17,576,596
1959	4,700,542	49.9	4,714,928	50.1	9,415,470	7,096,343	43.0	16,511,813

[1] As reported by Commonwealth of Pennsylvania, Department of Mines.

TABLE 22.—Power shovels and draglines used in recovering coal from culm banks and in stripping Pennsylvania anthracite, 1957–59, by type of power

Type of power	1957			1958			1959		
	Number of power shovels	Number of draglines	Total	Number of power shovels	Number of draglines	Total	Number of power shovels	Number of draglines	Total
Gasoline	22	11	33	23	8	31	14	6	20
Electric	52	50	102	47	48	95	51	45	96
Diesel	133	196	329	109	189	298	103	182	285
Steam	1		1						
Total	208	257	465	179	245	424	168	233	401

Digitized by Google

PRICES AND VALUE OF SALES

Because of the decline in overall demand for anthracite and the intense competition for business, anthracite producers absorbed the additional costs imposed by the new wage agreement that became effective February 1, 1959. In fact, the average value f.o.b. mine dropped from $8.88 per ton in 1958 to $8.35 in 1959, because shipments of the lower priced Buckwheat sizes increased 3 percent whereas shipments of the more costly Pea and larger sizes decreased 9 percent. As a result of the declines in average value and production, anthracite producers received $172.3 million for the year's output, a decrease of 8 percent.

Shipments of Pea and larger sizes declined 6 percent per ton in average value, and those of the smaller sizes fell 2 percent. Within the producing region, the reverse was true, as the larger sizes decreased only 3 percent in average value per ton and the smaller sizes declined 8 percent. The smaller sizes commanded higher prices in markets outside the producing region, as the average value rose 1 percent above 1958 but the larger sizes dropped 7 percent.

An examination of the values reported for the individual sizes indicates that Buckwheat No. 3 (Barley) gained most in average value per ton, (5 percent). Buckwheat Nos. 1 and 2, together decreased 1 percent in average value, but Buckwheat No. 4 returned 2

TABLE 23.—Standard anthracite specifications approved and adopted by the Anthracite Committee, effective July 28, 1947

Size	Round test mesh (inches)	Percent					
		Oversize, maximum	Undersize		Maximum impurities [1]		
			Maximum	Minimum	Slate	Bone	Ash [2]
Broken	Through 4⅜				1½	2	11
	Over 3¼ to 3		15	7½			
Egg	Through 3¼ to 3	5			1½	2	11
	Over 2⅛		15	7½			
Stove	Through 2⅛	7½			2	3	11
	Over 1⅝		15	7½			
Chestnut	Through 1⅝	7½			3	4	11
	Over 1⅜		15	7½			
Pea	Through 1⅜	10			4	5	12
	Over ⅝		15	7½			
Buckwheat No. 1	Through ⅝	10					13
	Over ⅝		15	7½			
Buckwheat No. 2 (Rice)	Through ⅝	10					13
	Over ⅜		17	7½			
Buckwheat No. 3 (Barley)	Through ⅜	10					15
	Over 3/32		20	10			
Buckwheat No. 4	Through 3/32	20					15
	Over 3/64		30	10			
Buckwheat No. 5	Through 3/64	30	No limit				16

[1] When slate content in the sizes from Broken to Chestnut, inclusive, is less than above standards, bone content may be increased by 1½ times the decrease in the slate content under the allowable limits, but slate content specified above shall not be exceeded in any event.

A tolerance of 1 percent is allowed on the maximum percentage of undersize and the maximum percentage of ash content.

The maximum percentage of undersize is applicable only to anthracite as it is produced at the preparation plant. Slate is defined as any material that has less than 40 percent fixed carbon.

Bone is defined as any material that has 40 percent or more, but less than 75 percent, fixed carbon.

[2] Ash determinations are on a dry basis.

Digitized by Google

percent and Buckwheat No. 5 returned 3 percent per ton more to producers. The average value for the "Other" size group (excluding dredged coal) declined 15 percent because of increased shipments of low-grade fine coal. Of the larger sizes, Pea declined least in average value (4 percent), compared with a decline of 7 percent for Egg, Stove, and Chestnut combined.

In contrast to the average f.o.b. mine prices, the following price ranges appeared in the December 26, 1959, issue of Saward's Journal: Broken, $15.25 per net ton; Egg, Stove, and Chestnut, $13.15–$15.25; Pea, $11.10–$12.75; Buckwheat No. 1, $10.65–$11.25; Buckwheat No. 2 (Rice), $10.00–$11.00; and Buckwheat No. 3 (Barley), $8.15–$8.50. Prices on smaller industrial sizes (Buckwheat No. 4 and smaller) are not quoted in trade journals, as they are usually sold in large lots at negotiated prices. The prices in Saward's Journal apply only to "standard" anthracite, specifications for which appear in table 23.

Retail prices of selected fuels in several cities are shown in table 24. Tables 25–28 give average values received for f.o.b. mine shipments by regions. Figure 5 shows the trends in shipments and values for 1950, 1955, and 1959, by size groups, in percent of total.

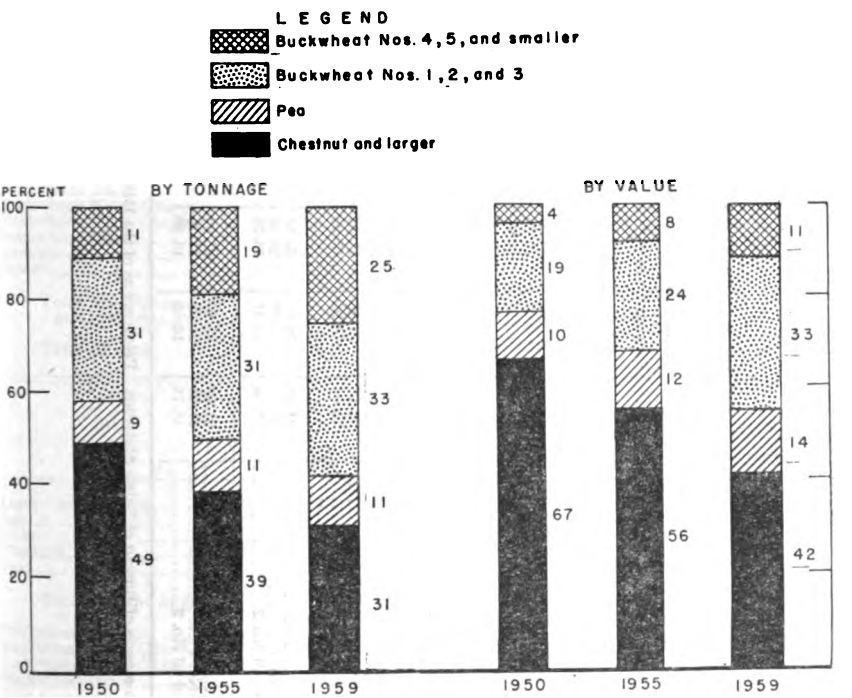

FIGURE 5.—Shipments of Pennsylvania anthracite, 1950, 1955, and 1959, by size groups, in percent of total tonnage and total value.

Digitized by Google

TABLE 24.—Retail prices of selected fuels in 1959, by months, for various cities [1]

(Coal and coke, per net ton; heating oil, per 100 gallons)

City and fuel	January	February	March	April	May	June	July	August	September	October	November	December
Baltimore, Md.:												
Anthracite:												
Stove	$23.00	$23.35	$23.35	$22.63	$22.28	$22.28	$22.28	$22.40	$22.49	$22.49	$22.49	$22.99
Buckwheat No. 1	19.40	19.66	19.66	19.45	19.19	19.19	19.19	19.23	19.23	19.23	19.23	19.23
Heating oil: Fuel oil No. 2	15.66	15.96	15.96	15.45	15.01	14.39	14.39	14.08	14.08	14.08	14.08	14.52
Boston, Mass.:												
Anthracite:												
Stove	31.50	31.50	31.50	31.50	30.92	29.94	30.69	30.69	30.69	30.69	31.25	31.50
Buckwheat No. 1	25.50	25.50	25.50	25.50	25.33	24.88	25.06	25.06	25.06	25.06	25.25	25.25
Heating oil: Fuel oil No. 2	15.88	15.88	15.88	15.68	15.28	14.58	14.52	14.27	14.27	14.27	14.35	14.77
New York, N.Y.:												
Anthracite:												
Stove	26.79	27.72	27.68	27.68	26.05	26.05	26.05	26.05	25.82	25.82	25.82	25.82
Pea	22.67	23.66	23.52	23.52	22.33	22.33	22.33	22.33	22.18	22.18	22.18	22.18
Buckwheat No. 1	20.63	21.62	21.33	21.33	20.43	20.43	20.43	20.43	20.62	20.62	20.62	20.62
Heating oil: Fuel oil No. 2	15.94	15.95	15.95	15.54	15.12	14.63	14.63	14.45	14.45	14.45	14.55	14.80
Philadelphia, Pa.:												
Anthracite:												
Chestnut	24.28	24.62	24.62	24.62	21.78	21.78	21.78	21.78	22.78	22.78	22.78	23.12
Buckwheat No. 1	20.62	20.95	20.95	20.95	19.28	19.28	19.28	19.28	20.28	20.28	20.28	20.45
Heating oil: Fuel oil No. 2	15.68	15.91	15.76	15.34	14.93	14.31	14.31	14.08	14.07	14.07	14.07	14.46
Washington, D.C.:												
Anthracite:												
Chestnut	27.99	27.99	27.99	27.99	25.54	25.70	26.72	27.41	27.73	27.83	27.83	27.83
Buckwheat No. 1	21.28	21.28	21.28	21.28	20.13	20.20	20.48	20.87	21.08	21.18	21.18	21.18
Heating oil: Fuel oil No. 2	15.75	16.05	16.05	15.54	15.04	14.45	14.43	14.12	14.12	14.12	14.12	14.63

[1] Compiled from reports of Bureau of Labor Statistics. Prices are as of the 15th of each month. Data are preliminary. Sales tax included where applicable.

Digitized by Google

TABLE 25.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points outside producing region, 1955–59, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region					Schuylkill region				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Lump [1] and Broken	$11.80	$12.78	$14.12	$11.99	$13.00	$11.03	$12.19	$14.67	$13.76	$12.22
Egg	11.14	11.61	13.12	12.03	12.09	11.05	11.93	13.28	12.10	11.27
Stove	11.70	11.94	13.54	12.85	11.87	11.14	11.95	12.81	11.92	11.08
Chestnut	11.81	12.02	13.56	13.02	11.97	11.02	11.87	12.82	11.93	11.12
Pea	8.13	8.50	10.39	9.97	9.58	7.90	8.77	10.36	9.69	9.06
Total Pea and larger	10.97	11.25	12.76	12.19	11.31	10.43	11.24	12.28	11.46	10.62
Buckwheat No. 1	6.61	7.25	9.53	9.30	8.92	6.34	6.95	9.13	8.82	8.58
Buckwheat No. 2 (Rice)	6.66	6.85	8.50	8.94	9.09	6.26	6.50	8.27	8.48	8.40
Buckwheat No. 3 (Barley)	5.29	5.38	6.48	6.88	7.51	5.11	5.35	6.38	6.62	6.98
Buckwheat No. 4	3.91	4.19	5.08	5.01	5.13	3.85	4.05	4.81	4.85	4.87
Buckwheat No. 5	3.18	3.80	4.82	4.77	4.99	3.04	3.65	4.75	4.44	4.41
Other	3.22	3.39	3.83	3.49	3.51	3.21	3.42	3.81	3.97	3.45
Total Buckwheat No. 1 and smaller	4.83	4.79	5.75	6.75	6.79	4.82	5.12	6.28	6.72	6.58
Total all sizes	7.59	7.21	8.10	9.10	8.77	7.20	7.60	8.52	8.75	8.23

Size	Wyoming region [2]					Sullivan County				
Lump [1] and Broken	$11.15	$13.15	$12.88	$12.40	$11.84	-------	-------	-------	-------	(3)
Egg	10.91	11.70	12.33	11.87	11.21	-------	-------	-------	-------	
Stove	11.46	12.06	12.97	12.17	11.27	-------	-------	-------	$12.07	
Chestnut	11.45	12.23	13.09	12.32	11.47	$10.00	$10.30	$11.00	12.14	
Pea	8.38	9.38	10.42	10.03	9.77	-------	9.22	10.00	10.01	
Total Pea and larger	11.08	11.77	12.60	11.89	11.07	10.00	9.98	10.49	11.28	(3)
Buckwheat No. 1	6.59	7.37	9.17	9.24	8.83	6.00	-------	-------	9.65	(3)
Buckwheat No. 2 (Rice)	6.61	7.00	8.42	8.68	8.94	-------	6.49	7.00	8.92	
Buckwheat No. 3 (Barley)	5.46	5.53	6.30	6.73	7.14	-------	5.07	-------	6.79	
Buckwheat No. 4	3.88	4.04	4.97	5.03	5.21	-------	-------	-------	-------	
Buckwheat No. 5	3.24	3.63	3.99	4.23	4.74	-------	-------	-------	-------	
Other	3.03	3.42	4.19	4.40	4.22	-------	-------	-------	4.73	
Total Buckwheat No. 1 and smaller	5.62	6.14	7.19	7.50	7.47	6.00	6.00	7.00	5.54	(3)
Total all sizes	9.09	9.77	10.45	10.15	9.48	9.00	6.89	8.90	6.91	(3)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [1] and Broken	$11.24	$12.81	$14.35	$13.35	(3)	$11.24	$12.81	$14.35	$13.35	$12.23
Egg	10.99	11.78	12.76	11.99		10.99	11.78	12.76	11.99	11.43
Stove	11.39	12.01	12.99	12.17		11.39	12.01	12.99	12.17	11.28
Chestnut	11.36	12.07	13.06	12.28		11.36	12.07	13.06	12.28	11.41
Pea	8.12	8.95	10.39	9.87		8.12	8.95	10.39	9.87	9.42
Total Pea and larger	10.83	11.50	12.50	11.76	(3)	10.83	11.50	12.50	11.76	10.93
Buckwheat No. 1	6.49	7.16	9.21	9.05	(3)	6.49	7.16	9.21	9.05	8.73
Buckwheat No. 2 (Rice)	6.46	6.74	8.36	8.63		6.46	6.74	8.36	8.63	8.70
Buckwheat No. 3 (Barley)	5.26	5.41	6.37	6.69		5.26	5.41	6.37	6.69	7.11
Buckwheat No. 4	3.87	4.09	4.91	4.92		3.87	4.09	4.91	4.92	5.00
Buckwheat No. 5	3.11	3.69	4.73	4.54		3.11	3.69	4.73	4.54	4.61
Other	3.18	3.41	3.89	4.08		3.18	3.41	3.89	4.08	3.69
Total Buckwheat No. 1 and smaller	5.05	5.31	6.38	6.94	(3)	5.05	5.31	6.38	6.94	6.88
Total all sizes	8.00	8.33	9.11	9.31	(3)	8.00	8.33	9.11	9.31	8.77

[1] Quantity of Lump included is insignificant.
[2] Sullivan County included with Wyoming region in 1959.

Digitized by Google

TABLE 26.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points inside producing region, 1955–59, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region					Schuylkill region				
	1955	1956	1957	1958	1959	1955	1956	1957	1958	1959
Lump [1] and Broken	-------	-------	-------	-------	$12.46	$10.97	$11.97	$13.54	$13.29	$12.81
Egg	$14.42	$13.34	$12.50	$11.77	11.85	11.04	12.29	13.11	12.34	11.02
Stove	13.27	13.87	13.45	12.84	12.46	10.94	11.86	12.52	11.28	10.95
Chestnut	14.31	13.65	15.10	14.62	13.48	10.85	11.94	12.50	11.62	11.06
Pea	11.39	11.20	12.72	12.58	12.10	8.60	9.20	10.47	9.71	9.34
Total Pea and larger	12.42	12.13	13.54	13.28	12.60	10.10	10.92	11.78	10.90	10.47
Buckwheat No. 1	10.10	9.81	11.20	11.00	11.11	6.42	6.93	8.95	8.62	8.65
Buckwheat No. 2 (Rice)	8.84	8.58	10.06	10.38	10.60	6.16	6.54	8.07	8.20	8.39
Buckwheat No. 3 (Barley)	6.78	6.87	7.60	7.60	7.90	4.76	5.04	5.92	6.12	6.24
Buckwheat No. 4	4.16	5.26	6.24	5.10	4.69	3.60	3.33	4.16	4.05	4.29
Buckwheat No. 5	-------	-------	3.83	3.65	4.66	2.61	2.68	3.48	2.83	4.30
Other	3.25	4.00	-------	2.04	1.85	2.05	2.82	3.41	3.10	2.32
Total Buckwheat No. 1 and smaller	7.51	8.37	9.95	5.95	4.85	5.43	5.83	6.87	5.40	5.05
Total all sizes	9.78	10.23	11.67	8.11	6.40	7.98	8.52	9.20	7.40	6.79

Size	Wyoming region [2]					Sullivan County				
Lump [1] and Broken	$10.86	$11.30	$13.02	-------	-------	-------	-------	-------	-------	(3)
Egg	11.23	12.54	12.89	$13.65	$11.67	-------	-------	-------	-------	
Stove	12.56	13.38	14.19	13.40	12.55	-------	-------	-------	-------	
Chestnut	12.77	13.39	14.44	14.00	13.60	$10.00	$12.40	$10.93	$10.00	
Pea	10.09	10.57	11.75	12.03	12.11	9.00	11.12	10.00	9.00	
Total Pea and larger	10.94	11.45	12.59	12.64	12.54	9.46	11.91	10.56	9.54	(3)
Buckwheat No. 1	8.38	8.62	10.25	10.76	10.92	6.00	-------	-------	7.00	(3)
Buckwheat No. 2 (Rice)	7.17	7.45	8.93	9.57	10.06	4.50	7.21	7.00	-------	
Buckwheat No. 3 (Barley)	5.50	5.51	6.34	6.97	7.19	-------	5.07	-------	-------	
Buckwheat No. 4	3.92	-------	4.34	4.63	4.87	-------	-------	-------	-------	
Buckwheat No. 5	-------	3.46	3.84	3.84	4.47	-------	-------	-------	-------	
Other	3.04	2.80	2.33	2.76	2.72	-------	-------	-------	3.30	
Total Buckwheat No. 1 and smaller	6.58	6.39	7.52	7.92	8.28	4.94	5.99	7.00	4.02	(3)
Total all sizes	8.78	8.77	9.88	10.03	10.23	6.35	10.17	9.25	5.54	(3)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [1] and Broken	$10.86	$11.32	$13.04	$13.29	(3)	$10.86	$11.32	$13.04	$13.29	$12.60
Egg	11.25	12.49	12.85	12.51		11.25	12.49	12.85	12.51	11.59
Stove	11.33	12.16	12.88	11.78		11.33	12.16	12.88	11.78	11.31
Chestnut	11.97	12.61	13.43	12.76		11.97	12.61	13.42	12.76	12.07
Pea	9.86	10.20	11.46	11.43		9.86	10.20	11.46	11.43	11.20
Total Pea and larger	10.75	11.26	12.32	11.94	(3)	10.75	11.26	12.32	11.94	11.53
Buckwheat No. 1	7.89	8.04	9.84	10.01	(3)	7.88	8.04	9.84	10.01	10.03
Buckwheat No. 2 (Rice)	7.12	7.21	8.76	9.16		7.10	7.21	8.76	9.16	9.43
Buckwheat No. 3 (Barley)	5.25	5.36	6.18	6.60		5.25	5.36	6.18	6.60	6.69
Buckwheat No. 4	3.72	3.41	4.19	4.10		3.72	3.41	4.19	4.10	4.35
Buckwheat No. 5	2.61	3.37	3.76	3.37		2.61	3.37	3.76	3.37	4.34
Other	3.05	2.86	2.73	2.82		3.05	2.86	2.73	2.82	2.24
Total Buckwheat No. 1 and smaller	6.29	6.32	7.44	6.43	(3)	6.28	6.32	7.44	6.42	5.88
Total all sizes	8.59	8.77	9.73	8.58	(3)	8.58	8.77	9.73	8.57	7.84

[1] Quantity of Lump included is insignificant.
[2] Sullivan County included with Wyoming region in 1959.

Digitized by Google

TABLE 27.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points outside and inside producing region in 1959, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region			Schuylkill region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken	$13.00	$12.46	$12.88	$12.22	$12.81	$12.24
Egg	12.09	11.85	12.06	11.27	11.02	11.26
Stove	11.87	12.46	11.89	11.08	10.95	11.06
Chestnut	11.97	13.48	12.11	11.12	11.05	11.11
Pea	9.58	12.10	10.07	9.06	9.34	9.14
Total Pea and larger	11.31	12.60	11.44	10.62	10.47	10.59
Buckwheat No. 1	8.92	11.11	9.22	8.58	8.65	8.60
Buckwheat No. 2 (Rice)	9.09	10.60	9.56	8.40	8.39	8.39
Buckwheat No. 3 (Barley)	7.51	7.90	7.55	6.98	6.24	6.84
Buckwheat No. 4	5.13	4.69	5.11	4.87	4.29	4.80
Buckwheat No. 5	4.99	4.66	4.96	4.41	4.30	4.37
Other	3.51	1.85	2.31	3.45	2.32	2.75
Total Buckwheat No. 1 and smaller	6.79	4.85	6.27	6.58	5.05	6.14
Total all sizes	8.77	6.40	8.28	8.23	6.79	7.85

Size	Wyoming region [2]			Total		
Lump [1] and Broken	$11.84		$11.84	$12.23	$12.60	$12.25
Egg	11.21	$11.67	11.22	11.43	11.59	11.44
Stove	11.27	12.55	11.32	11.28	11.31	11.29
Chestnut	11.47	13.60	11.75	11.41	12.07	11.53
Pea	9.77	12.11	10.85	9.42	11.20	10.03
Total Pea and larger	11.07	12.54	11.36	10.93	11.53	11.04
Buckwheat No. 1	8.83	10.92	9.48	8.73	10.03	9.04
Buckwheat No. 2 (Rice)	8.94	10.06	9.27	8.70	9.43	8.90
Buckwheat No. 3 (Barley)	7.14	7.19	7.15	7.11	6.69	7.04
Buckwheat No. 4	5.21	4.87	5.20	5.00	4.35	4.95
Buckwheat No. 5	4.74	4.47	4.70	4.61	4.34	4.54
Other	4.22	2.72	3.53	3.69	2.24	2.80
Total Buckwheat No. 1 and smaller	7.47	8.28	7.69	6.88	5.88	6.60
Total all sizes	9.48	10.23	9.65	8.77	7.84	8.55

[1] Quantity of Lump included is insignificant. [2] Includes Sullivan County.

TABLE 28.—Average value per net ton of Pennsylvania anthracite from all sources, 1958–59, by regions [1]

Region	1958				1959			
	Shipped outside region	Local sales	Colliery fuel	Total production	Shipped outside region	Local sales	Colliery fuel	Total production
Lehigh	$9.04	$8.11	$7.48	$8.87	$8.75	$6.40	$7.60	$8.27
Schuylkill	8.20	7.31	7.34	7.99	7.80	6.74	7.51	7.53
Wyoming	10.13	10.03	5.74	10.03	[2] 9.48	[2] 10.23	[2] 5.63	[2] 9.59
Total, excluding Sullivan County	9.02	8.52	6.33	8.88	(3)	(3)	(3)	(3)
Sullivan County	6.91	5.54	10.00	6.27				
Total	9.02	8.51	6.33	8.88	8.53	7.80	5.97	8.35

[1] Value given for shipments is value at which coal left possession of producing company and does not include margins of separately incorporated sales companies.
[2] Sullivan County included with Wyoming region.

Digitized by Google

EMPLOYMENT

Employment at anthracite operations continued the decline which has persisted each year since 1947. Measured by the average number of men working daily, employment in 1959 totaled 23,294 men, 12 percent fewer than in 1958. The greater proportional decline in employment than in production resulted primarily from the continued concentration of output at the more efficient underground operations and at strip pits and culm banks.

Of total industry employment, as shown in table 29, 44 percent was in the Schuylkill region, 42 percent in the Wyoming, and 14 percent in the Lehigh. For the first time in the modern history of the industry, the number of men working in the Schuylkill region surpassed the number in the Wyoming. However, employment declined in each of the regions as follows: Schuylkill, 8 percent; Lehigh, 11 percent; and Wyoming, 16 percent.

TABLE 29.—Men employed, days worked, man-days of labor, and output per man-day at operations producing Pennsylvania anthracite in 1959

(Includes operations of strip contractors)

	Lehigh region	Schuylkill region	Wyoming region [1]	Total	
				1959	1958
Average number of men working daily:					
Underground	1,204	4,513	6,183	11,900	13,850
In strip pits	939	1,920	916	3,775	4,418
At culm banks	169	463	137	769	867
At preparation plant	659	1,861	892	3,412	3,574
Other surface	344	1,317	1,614	3,275	3,685
Total excluding dredge operations	3,315	10,074	9,742	23,131	26,394
Dredge operations	17	146		163	146
Total average number of men working daily	3,332	10,220	9,742	23,294	26,540
Average number of days active:					
All operations except dredges	180	177	167	173	183
Dredge operations	139	197		191	210
Average days active, all operations	179	177	167	173	183
Man-days of labor:					
All operations except dredges	595,116	1,784,220	1,625,175	4,004,511	4,830,307
Dredge operations	2,366	28,697		31,063	30,707
Total man-days, all operations	597,482	1,812,917	1,625,175	4,035,574	4,861,014
Average tons per man per day:					
All operations except dredges	5.75	5.37	4.27	4.98	4.24
Dredge operations	5.63	24.50		23.07	22.53
Average tons per man-day, all operations	5.75	5.67	4.27	5.12	4.36

[1] Includes Sullivan County.

Schuylkill and Luzerne were the leading counties in the number of men working daily at anthracite operations. (See table 30.) Employment was approximately the same in both counties and, combined, represented 70 percent of the total for the industry. Employment in each of the major producing counties declined. The decreases ranged from 6 percent in Northumberland County to 23 percent in Lackawanna.

Digitized by Google

TABLE 30.—Men employed at operations producing Pennsylvania anthracite, 1958–59, by counties

(Includes operations of strip contractors)

County	1958	1959	County	1958	1959
Carbon	278	287	Luzerne	9,399	8,117
Columbia	965	789	Northumberland	2,912	2,730
Dauphin	176	212	Schuylkill	9,091	8,264
Lackawanna	3,592	2,758	Sullivan	23	25
Lancaster, Lebanon, Northampton, and Snyder [1]	87	108	Susquehanna and Wayne [2]	17	4
			Total	26,540	23,294

[1] Counties producing dredge coal only.
[2] None employed in Susquehanna in 1959.

Of total industry employment in 1959, 51 percent were employed in underground workings, 16 percent at strip mines, 15 percent in preparation plants, 14 percent in surface work at underground mines, 3 percent at culm banks, and 1 percent on dredges. The number of men in each type of work declined except on dredges where the number increased slightly.

Anthracite operations were active an average of 173 days in 1959—10 less than in 1958. Activity was highest in the Lehigh and Schuylkill regions (179 and 177 days, respectively), and lowest in the Wyoming region (167 days). As a result of the decrease in the number of days worked and the reduced labor force, man-days totaled only slightly more than 4 million, a 17 percent decline from 1958.

The productivity rate in the anthracite industry advanced to a record of 5.12 tons per man-day, a 17 percent gain over the former record of 4.36 tons in 1958. The gain in 1959 reflects the decreased production from underground mines and the increases at strip mines and culm banks, which have appreciably higher productivity rates than deep mines. The productivity rate was virtually the same in the Lehigh and Schuylkill regions (5.75 and 5.67 tons per man-day, respectively), but in the Wyoming region, it was much lower (4.27 tons). These variations in productivity result primarily from the different proportions of deep, strip, culm-bank, and dredge coal produced in each region.

DISTRIBUTION

Based on reports submitted to the Bureau of Mines, 20,293,000 net tons of Pennsylvania anthracite was shipped to market during the 1958–59 coal year, a decline of 16 percent from the preceding coal year. Of this amount, 90 percent was destined to points within the United States, 7 percent to Canada, and 3 percent overseas. Compared with the 1957–58 coal year, shipments in 1958–59 fell 11 percent in both American and Canadian markets and 69 percent in exports to all other countries.

Table 31 shows the distribution of Pennsylvania anthracite in the 1958–59 coal year, by sizes and by States and Provinces of destination. Data on exports, by sizes and countries of destination, are shown for 1958–59 in table 32.

569112—60——12

Digitized by Google

TABLE 31.—Distribution of Pennsylvania anthracite, April 1, 1958, to March 31, 1959, by States, and Provinces of destination, in net tons

Destination	Pea and larger						Buckwheat No. 1 and smaller					Total all sizes	Percent of total
	Broken	Egg	Stove	Chestnut	Pea	Total	Buckwheat No. 1	Buckwheat No. 2 (Rice)	Buckwheat No. 3 (Barley)	All other sizes	Total		
United States:													
New England States:													
Connecticut	----------	1,475	69,944	79,406	5,944	156,769	12,833	12,638	21,750	20	47,241	204,010	1.01
Maine	----------	2,241	44,380	39,662	958	87,241	6,550	8,771	----------	694	16,015	103,256	.51
Massachusetts	573	26,975	285,891	128,178	12,565	454,182	55,972	49,492	26,201	956	132,621	586,803	2.89
New Hampshire	----------	1,572	32,426	20,842	1,364	56,204	8,112	11,785	8,133	2,456	30,486	86,690	.43
Rhode Island	----------	1,637	22,813	15,075	1,082	40,607	6,243	3,762	----------	160	10,165	50,772	.25
Vermont	142	1,362	42,263	28,390	4,622	76,779	20,927	24,454	49	90	45,520	122,299	.60
Total	715	35,262	497,717	311,553	26,535	871,782	110,637	110,902	56,133	4,376	282,048	1,153,830	5.69
Middle Atlantic States:													
New Jersey	809	13,014	281,151	624,099	218,901	1,137,974	223,951	211,596	461,919	365,214	1,262,680	2,400,654	11.83
New York	1,266	58,666	833,707	777,016	717,252	2,387,907	923,792	421,640	477,611	448,780	2,271,823	4,659,730	22.96
Pennsylvania [1]	8,522	26,033	603,776	1,354,487	1,306,581	3,299,399	1,115,048	968,669	1,429,558	1,716,161	5,229,436	8,528,835	42.03
Total	10,597	97,713	1,718,634	2,755,602	2,242,734	6,825,280	2,262,791	1,601,905	2,369,088	2,530,155	8,763,939	15,589,219	76.82
South Atlantic States: [2]													
Delaware	3,106	717	22,793	59,491	2,443	88,550	2,977	6,201	15,705	9,939	34,822	123,372	.61
District of Columbia	----------	1,570	16,760	15,155	1,717	35,202	12,082	1,026	671	1,528	15,307	50,509	.25
Maryland	----------	1,762	80,359	85,537	13,537	181,195	26,291	5,535	267	264,985	297,078	478,273	2.35
Virginia	----------	414	10,040	11,313	2,866	24,633	2,896	157	120	383	3,556	28,189	.14
Total	3,106	4,463	129,952	171,496	20,563	329,580	44,246	12,919	16,763	276,835	350,763	680,343	3.35
Lake States: [3]													
Illinois	----------	153	3,665	7,270	9,165	20,253	41,765	15,904	1,834	16,520	76,023	96,276	.48
Michigan	----------	424	14,762	7,811	482	23,479	59	6,129	1	10,547	16,736	40,215	.20
Minnesota	----------	----------	1,003	1,303	136	2,442	15,256	214	47	43,254	58,771	61,213	.30
Ohio	----------	1,426	405	3,240	280	5,351	24,276	10,577	446	144,424	179,723	185,074	.91
Wisconsin	----------	20	34,019	46,343	4,119	84,501	3,256	3,812	----------	58,451	65,519	150,020	.74
Total	----------	2,023	53,854	65,967	14,182	136,026	84,612	36,636	2,328	273,196	396,772	532,798	2.63
All other States	52	3,950	4,134	12,362	3,347	23,845	42,997	6,164	17,364	131,440	197,965	221,810	1.09
Total United States	14,470	143,411	2,404,291	3,316,980	2,307,361	8,186,513	2,545,283	1,768,526	2,461,676	3,216,002	9,991,487	18,178,000	89.58

Digitized by Google

Canada:													
Ontario	----------	10,140	542,556	379,201	63,231	995,128	43,882	26,888	1,993	7,118	79,881	1,075,009	5.30
Quebec	----------	3,771	118,041	68,849	5,859	196,520	97,722	55,686	46,281	15,913	215,602	412,122	2.03
Other Provinces	206	2,328	10,895	7,564	----------	20,993	215	1,327	----------	918	2,460	23,453	.11
Total Canada	206	16,239	671,492	455,614	69,090	1,212,641	141,819	83,901	48,274	23,949	297,943	1,510,584	7.44
Other countries	273	----------	748	2,702	72,488	76,211	58,915	93,237	36,429	339,861	528,442	604,653	2.98
Grand total	14,949	159,650	3,076,531	3,775,296	2,448,939	9,475,365	2,746,017	1,945,664	2,546,379	3,579,812	10,817,872	20,293,237	100.00

[1] Includes "local sales."
[2] Shipments to other States generally referred to as being in the South Atlantic area are included in "All other States."
[3] Shipments to Indiana are included in "All other States."

Digitized by Google

TABLE 32.—Exports of Pennsylvania anthracite to countries other than Canada, April 1, 1958, to March 31, 1959, in net tons

Country	Pea and larger					
	Broken	Egg	Stove	Chestnut	Pea	Total
North and Central America:						
Cuba				856	41,485	42,341
Bermuda, Mexico, and Trinidad and Tobago	273			78		351
Total	273			934	41,485	42,692
South America: Brazil				378	5,763	6,141
Europe:						
France						
Italy			748	1,390	12,700	14,838
Netherlands					12,540	12,540
Total			748	1,390	25,240	27,378
Asia: Israel and Vietnam						
Grand total [1]	273		748	2,702	72,488	76,211

Country	Buckwheat No. 1 and smaller					Total all sizes
	Buckwheat No. 1	Buckwheat No. 2 (Rice)	Buckwheat No. 3 (Barley)	All other sizes	Total	
North and Central America:						
Cuba	21,870			14,626	36,496	78,837
Bermuda, Mexico, and Trinidad and Tobago						351
Total	21,870			14,626	36,496	79,188
South America: Brazil	3,527				3,527	9,668
Europe:						
France		1,383		243,822	245,205	245,205
Italy	3,688		21,084	28,487	53,259	68,097
Netherlands	9,640	91,854	15,345	31,546	148,385	160,925
Total	13,328	93,237	36,429	303,855	446,849	474,227
Asia: Israel and Vietnam	20,190			21,380	41,570	41,570
Grand total [1]	58,915	93,237	36,429	339,861	528,442	604,653

[1] According to data released by the Bureau of the Census, U.S. Department of Commerce, exports of Pennsylvania anthracite to non-Canadian destinations totaled 614,502 net tons.

In contrast with the trend in recent years, shipments of the larger space-heating sizes declined less during the 1958–59 coal year than the smaller industrial sizes. This reversal generally was attributed to colder weather and decreased industrial activity. For example, shipments of Pea and larger sizes declined only 5 percent in the United States, but shipments of the smaller sizes fell 15 percent. The effect of weather conditions on coal demand was reflected also by some Buckwheat sizes. Shipments of Buckwheat Nos. 1, 2, and 3, substantial quantities of which are burned in automatic space-heating equipment, showed declines of 8, 7, and 3 percent, respectively, when compared with the 1957–58 coal year. On the other hand, shipments of Buckwheat No. 4 and smaller declined 29 percent as a result of depressed business conditions and stock withdrawals. The same situation was evident in the export trade. Shipments of Pea and larger

Digitized by Google

to Canada fell 8 percent, whereas the Buckwheat sizes declined approximately 22 percent. Exports of Pea and larger sizes to other countries decreased about 500,000 tons and Buckwheat No. 1 and smaller, 900,000 tons.

Truck shipments (including "local sales") reported to the Bureau totaled 7,821,000 tons, a decrease of about 3 percent from the 1957–58 coal year. However, because of the sharp decline in reported rail shipments (22 percent), the percentage of the year's output trucked to market reached 39 percent of the total, a record high. The abrupt decline in the export trade contributed heavily to the decrease in rail traffic, as all export cargoes originate at the mine as rail shipments.

The effect of the decline in exports upon rail traffic was minimized during the last three-quarters of the calendar year 1959. In contrast with the decline of 22 percent for the coal year ending March 31, monthly data published by the Pennsylvania Department of Mines and Mineral Industries indicate that rail traffic declined only 11 percent in the calendar year 1959. Truck traffic declined 4 percent as compared with 1958. (See tables 33 to 35.) According to the same source, the only major markets to record increases in truck receipts were New York and Pennsylvania areas outside the producing region; both had increases of 3 percent. Of markets showing losses, the producing region itself registered the largest tonnage decline (about 400,000 tons) and New Jersey the greatest percentage decline (13 percent). Each of the major rail markets except Canada also suffered losses, but the gain for Canada was less than 1 percent. The loss in rail shipments to New Jersey was 23 percent, New England States 10 percent, and 9 percent to New York. The substantial increases in rail shipments to Ohio, Indiana, Illinois, and "Other States" undoubtedly were caused by improved business conditions and restocking by industries in those areas.

TABLE 33.—Rail shipments of Pennsylvania anthracite, 1956–59, by destinations, in net tons [1]

[Pennsylvania Department of Mines and Mineral Industries]

Destination	1956	1957	1958	1959
New England States	1,574,898	1,287,632	1,032,680	932,593
New York	4,793,285	3,723,217	2,995,230	2,728,926
New Jersey	2,529,223	1,927,658	1,534,953	1,178,965
Pennsylvania	4,735,222	4,622,699	2,814,258	2,449,545
Delaware	108,308	86,231	69,816	57,597
Maryland	277,378	293,316	268,054	185,073
District of Columbia	66,121	39,244	39,901	43,664
Virginia	37,992	28,207	32,378	19,262
Ohio	417,813	251,585	148,711	260,278
Indiana	51,692	24,427	35,540	53,785
Illinois	115,143	133,817	81,090	99,826
Wisconsin	128,753	103,155	83,921	72,346
Minnesota	21,965	89,023	10,011	10,740
Michigan	83,907	52,718	30,723	28,815
Other States	133,495	165,434	100,560	160,260
Total United States	15,075,195	12,828,363	9,277,826	8,281,675
Canada	2,091,718	1,588,304	1,304,214	1,311,841
Other foreign countries	1,567,842	1,663,819	459,129	187,883
Grand total	18,734,755	16,080,486	11,041,169	9,781,399

[1] Does not include dredge coal.

Digitized by Google

TABLE 34.—Truck shipments of Pennsylvania anthracite, 1956–59, by destinations, in net tons

[Pennsylvania Department of Mines and Mineral Industries]

Destination	1956	1957	1958	1959
Pennsylvania:				
Within region	4,309,771	4,396,417	4,306,015	3,904,608
Outside region	1,965,204	2,006,029	2,624,608	2,704,972
New York	1,129,658	1,170,358	1,239,218	1,279,693
New Jersey	725,563	681,992	714,060	619,926
Delaware	28,911	33,452	42,169	44,748
Maryland	77,722	65,298	103,899	98,118
District of Columbia	3,779	2,800	4,174	6,639
Other States	11,739	9,574	15,116	13,669
Total	8,252,347	8,365,920	9,049,259	8,672,373

TABLE 35.—Truck shipments of Pennsylvania anthracite in 1959, by months and by States of destination, in net tons [1]

Destination	January	February	March	April	May	June	July
Pennsylvania:							
Within region	514,680	361,541	337,694	348,049	269,483	258,915	184,864
Outside region	326,038	235,138	212,629	195,053	177,091	196,401	152,963
New York	134,877	95,927	91,742	73,685	76,011	110,586	82,151
New Jersey	83,488	44,976	41,168	38,797	40,520	57,550	42,061
Delaware	6,500	4,832	4,294	2,132	890	2,849	1,633
Maryland	18,625	9,636	6,244	3,449	2,193	4,133	3,419
District of Columbia	1,790	1,146	594	122	30	186	123
Other States	1,942	1,072	875	475	675	522	648
Total: 1959	1,087,940	754,268	695,240	661,762	566,893	631,142	467,882
1958	921,645	931,330	604,910	963,217	665,113	686,953	467,091

Destination	August	September	October	November	December	Total	Percent of total trucked
Pennsylvania:							
Within region	236,375	284,814	309,807	374,534	423,852	3,904,608	45.0
Outside region	213,293	229,087	235,065	248,078	284,116	2,704,972	31.2
New York	103,432	174,981	115,275	99,706	121,320	1,279,693	14.8
New Jersey	53,693	64,720	56,838	45,250	50,865	619,926	7.1
Delaware	3,473	2,355	2,784	3,170	9,836	44,748	.5
Maryland	5,824	7,617	9,595	12,760	14,623	98,118	1.1
District of Columbia	205	282	174	735	1,252	6,639	.1
Other States	1,016	1,399	1,683	1,569	1,793	13,669	.2
Total: 1959	617,311	765,255	731,221	785,802	907,657	8,672,373	100.0
1958	589,508	719,071	742,490	637,660	1,120,271	9,049,259	100.0

[1] Compiled from reports of Pennsylvania Department of Mines and Mineral Industries; does not include dredge coal.

After falling abruptly in 1958, Lake shipments of anthracite made marked gains in 1959. Loadings at Lake Erie docks totaled 329,000 tons, an increase of approximately 27 percent, and Lake Ontario loadings were more than double the 10,000 tons loaded in 1958. The Upper Lake trade continued to decline, however, as receipts at Duluth-Superior fell 23 percent and receipts at docks on Lake Superior and Lake Michigan dropped 23 and 31 percent, respectively. Likewise, the quantity of anthracite reloaded for inland delivery at Lake Superior and Lake Michigan docks fell 27 and 20 percent below 1958. Table 2 presents detailed monthly data on the Lake trade in Pennsylvania anthracite.

Digitized by Google

According to reports of the Massachusetts Division on the Necessaries of Life, New England rail receipts of anthracite totaled 867,000 tons in 1959, a drop of 14 percent. For 1957, the same agency reported receipts of 1.3 million tons. Thus, the apparent loss in 2 years was almost one-third of the New England rail market. Tidewater receipts again were only an insignificant part of the total. Tables 2 and 36 give detailed data on New England receipts of anthracite.

TABLE 36.—Receipts of anthracite in New England, 1917, 1920, 1923, 1927, and 1944–59, in thousand net tons

Year	Receipts by tidewater	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]	Year	Receipts by tidewater [4]	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]
1917	[1] 4,421	7,259	1	11,679	1950	81	3,615	18	3,678
1920	[1] 3,521	7,804	1	11,324	1951	66	3,135	27	3,174
1923	[1] 4,082	8,102	145	12,039	1952	70	2,847	29	2,888
1927	[1] 2,421	6,725	106	9,040	1953	49	2,088	31	2,106
1944	[4] 398	5,836	12	6,222	1954	10	1,893	6	1,897
1945	[4] 331	4,750	(5)	5,081	1955	5	1,713	(5)	1,718
1946	[4] 399	5,244		5,643	1956	10	1,610	(5)	1,620
1947	[4] 240	4,498		4,738	1957	3	1,262		1,265
1948	[4] 217	4,646		4,863	1958	3	1,009		1,012
1949	[4] 110	3,336		3,446	1959	2	867	(5)	869

[1] Commonwealth of Massachusetts, Division on the Necessaries of Life.
[2] U.S. Department of Commerce.
[3] Total receipts by rail and by tidewater less imports.
[4] Association of American Railroads.
[5] Less than 500 tons.

CONSUMPTION

Although competitive fuels continued to make inroads into anthracite space-heating markets, apparent consumption of Pennsylvania anthracite (production, plus imports, minus exports, plus or minus changes in producer's stocks) showed little change from 1958 because of increased shipments of the smaller industrial sizes. For 1959, apparent consumption in the United States totaled 18.8 million tons, 1 percent less than in 1958. As in 1958, the continuing decline in the export trade played a major part in restricting output, the one-half-million-ton drop in exports accounting for a preponderant share of the loss between the 2 years.

According to estimates by the Bureau of Mines, retail deliveries of space-heating sizes (Buckwheat No. 2 and larger) declined 19 percent. However, the sample on which these estimates are based does not include dealers in the "local sales" area or over-the-road truckers who deliver directly to consumers. As indicated in the Distribution section of this chapter, truck shipments of all sizes fell only 4 percent below 1958 and sales in the producing region, 9 percent. The drop from 1958 of 7 percent in the degree-day heat demand in major anthracite markets undoubtedly contributed to the overall decline in the business of retailers and truckers.

Despite the protracted steel strike of 1959, the iron and steel industry used 45 percent more anthracite for cokemaking and 14 percent more for beneficiating iron ore. At Pennsylvania cement

Digitized by Google

plants consumption declined from 183,000 tons to 159,000 tons. The production of fuel briquets fell drastically, resulting in a 64 percent decrease in the tonnage of anthracite used in their manufacture. Consumption by Class I railroads also continued to decline, the 292,000 tons reported used in 1959 representing a drop of 13 percent. Continued favorable water conditions and increased efficiency rates decreased the quantity of anthracite used to generate electricity. For 1959, the Federal Power Commission reported a consumption of 2,639,000 tons of anthracite at thermal power stations, a decrease of 5 percent. Retail deliveries and consumption data for certain industrial users are presented in table 37. Consumption of anthracite, briquets, domestic coke, heating and range oils, and natural gas in the primary anthracite marketing areas is shown in table 38. Monthly consumption data for public utilities and railroads are shown in table 2.

TABLE 37.—Retail-dealer deliveries and consumption of Pennsylvania anthracite in the United States, 1954–59, by selected consumer categories

(Thousand net tons)

Year	Retail dealer deliveries [1]	Used as colliery fuel	Used by railroads [2]	Used for generating electricity [3]	Used in the manufacture of briquets	Used at cement plants	Used in the iron and steel industry		
							For coke making	For sintering and pelletizing [4]	Other uses [5]
1954	13,627	608	446	3,166	261	200	229	(6)	437
1955	13,019	419	457	3,209	264	199	366	385	443
1956	13,018	342	409	3,296	228	244	377	564	625
1957	10,670	279	361	3,363	156	221	389	868	698
1958	9,386	195	335	2,786	120	183	255	685	686
1959	7,562	129	292	2,639	43	159	369	780	683

[1] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.
[2] Association of American Railroads.
[3] Federal Power Commission.
[4] Annual Statistical Report, American Iron and Steel Institute.
[5] Annual Statistical Report, American Iron and Steel Institute. Contains a small but undetermined amount of anthracite used for sintering.
[6] Not available.

Mechanical Stokers.—After dropping to 5,190 units in 1953, factory sales of anthracite stokers began a sharp upturn as a result of a concerted promotional effort by the anthracite industry and equipment manufacturers. According to the Bureau of the Census, U.S. Department of Commerce, sales of Class I residential stokers (capacity under 61 pounds of coal per hour) climbed to 7,143 units in 1954 and yearly sales have since ranged from 8,000 to 9,000 units, except in 1958 when 7,983 units were sold. In 1959, sales of stokers of this type totaled 8,484 units. Sales of Class 2 stokers (small commercial stokers with a capacity between 61 and 100 pounds per hour) failed to increase markedly over the same period, ranging from a low of 198 units in 1958 to a high of 412 in 1954. Sales of this type totaled 267 units in 1959. Although no detailed data are available, annual sales of larger capacity anthracite stokers (more than 100 pounds per hour) reportedly are increasing rapidly and are estimated by the Anthracite Institute to be three or four times as great as a few years ago.

Digitized by Google

TABLE 38.—Apparent consumption of anthracite and selected competitive fuels in the principal anthracite markets, 1956–59

(Thousand net tons)

Fuel	New England	New York	New Jersey	Pennsylvania	Delaware	Maryland	District of Columbia	Total	Percent of total fuels
Anthracite (All users):[1]									
1956	1,575	[2] 5,923	[2] 3,255	11,010	137	355	70	22,325	18.5
1957	1,288	[2] 4,893	[2] 2,610	11,025	120	358	42	20,336	17.3
1958	1,033	[2] 4,234	[2] 2,249	9,745	112	372	44	17,789	[3] 13.3
1959	933	[2] 4,009	[2] 1,799	9,059	102	283	50	16,235	12.1
Imported:[4]									
1956	(5)							(5)	(6)
1957									
1958									
1959		(5)						(5)	(6)
Briquets (domestic use):									
1956	17	6	1	9	(5)	6	1	40	(6)
1957	12	4	1	7	(5)	5	1	30	(6)
1958	9	3	1	7	(5)	5	1	26	(6)
1959	(5)	(5)		1		1		2	(6)
Coke (domestic use):									
1956	334	70	202	87	(5)			693	.6
1957	221	58	162	57	(5)	(5)		498	.4
1958	201	53	146	50	(5)	1		451	.4
1959	162	37	116	34	(5)			349	.3
Imported:[4]									
1956	7	12						19	(6)
1957	(5)	12						12	(6)
1958		13						13	(6)
1959	(5)	15						15	(6)
Oil (heating and range):[7]									
1956	25,789	20,402	10,253	9,186	911	4,617	1,317	72,475	60.2
1957	24,807	19,820	10,112	9,090	903	4,559	1,287	70,578	60.0
1958 [3]	30,289	26,850	10,464	10,553	1,293	4,793	1,309	85,551	63.9
1959	28,097	27,123	13,513	10,715	1,065	3,875	1,195	85,583	64.1
Natural gas:[8]									
1956	2,252	8,633	2,366	9,382	(9)	(9)	[9] 2,243	24,876	20.7
1957	2,455	9,095	2,544	9,872	(9)	(9)	[9] 2,328	26,294	22.3
1958	3,096	10,227	3,103	10,939	(9)	(9)	[9] 2,649	30,014	[3] 22.4
1959	3,204	11,017	3,160	11,256	(9)	(9)	[9] 2,701	31,338	23.5
Total:									
1956	29,974	35,046	16,077	29,674	[10] 1,048	[10] 4,978	[10] 3,631	120,428	100.0
1957	28,783	33,882	15,429	30,051	[10] 1,023	[10] 4,922	[10] 3,658	117,748	100.0
1958 [3]	34,628	41,380	15,963	31,294	[10] 1,405	[10] 5,171	[10] 4,003	133,844	100.0
1959	32,396	42,201	18,588	31,065	[10] 1,167	[10] 4,159	[10] 3,946	133,522	100.0

[1] Pennsylvania Department of Mines and Mineral Industries.
[2] An important but undetermined part of anthracite shown as shipped to New Jersey is reshipped to New York City.
[3] Revised.
[4] U.S. Department of Commerce.
[5] Less than 500 tons.
[6] Less than 0.05 percent.
[7] Converted to coal equivalent on basis of 4 barrels of fuel oil equaling 1 ton of coal.
[8] Converted to coal equivalent on basis of 24,190 cubic feet of natural gas equaling 1 ton of coal.
[9] Delaware and Maryland included with District of Columbia.
[10] Natural gas for Delaware and Maryland included with District of Columbia.

STOCKS

As a result of the difficulties caused by excessive stocks in the early 1950's, anthracite producers in recent years seldom have accumulated more than 500,000 tons in ground storage. Aside from the cost of storing large quantities at or near the mines, the producing industry apparently has concluded that stocks of this magnitude provide adequate storage for sizes temporarily in "long" supply and a cushion against the variations in demand for particular sizes often created by fluctuations in the weather and industrial activity. The monthly stock data for 1959 show no radical departure from the usual seasonal

Digitized by Google

pattern or the apparent ceiling on stocks. After dropping to the year's low of 281,000 tons in March, producers' stocks in ground storage climbed slowly over the summer months to a peak of 470,000 tons at the end of October. By the close of the year, the figure had dropped to 429,000 tons, compared with 406,000 tons at the end of 1958.

There has been a noticeable change in inventory practices at retail yards during the past few years. Most of the decline in the total stocked by retail dealers has been due to the sharp decrease in the number of dealers handling anthracite and in the tonnage sold at retail. However, the growing tendency of many domestic consumers to purchase coal in small lots as needed apparently has convinced many dealers that yards can be operated efficiently with lower inventories than in previous years. For example, stocks in retail yards at the end of 1956 were estimated by the Bureau of Mines at 1,498,000 tons. By the end of 1959, the estimated total had fallen to 1,034,000 tons—a decline of almost one-third from the 1956 total and 17 percent below 1958. As in 1958 the low again occurred in March, but the peak was reached in September (1,184,000 tons) rather than October.

Public utilities continued to reduce their inventories of anthracite during 1959. Yearend stocks totaled 2,018,000 tons, 10 percent less than at the end of 1958. As public utilities reported 5 percent less consumption than in 1958, they apparently either reduced purchases or production from privately owned sources of coal, or both. The downward trend in stocks held by Class I railroads, interrupted in 1958, resumed in 1959. Yearend stocks totaled 32,000 tons, a 21-percent reduction.

The decline in receipts at Upper-Lake docks was accompanied by a decrease in stocks. Coal in storage at Lake Superior docks dropped 13 percent from the 57,000 tons reported at the end of December 1958. Lake Michigan stocks declined moderately—from 27,000 to 25,000 tons. Coke plants increased inventories slightly, the 109,000 tons held at yearend representing a gain of 5 percent over 1958.

FOREIGN TRADE [4]

According to the Bureau of the Census, U.S. Department of Commerce, exports of Pennsylvania anthracite totaled slightly less than 1.8 million net tons in 1959, a decline of 22 percent or 0.5 million tons from 1958. Most of the loss was in shipments to Europe. There were only minor decreases in exports to North and South America and Asia.

Exports to Canada dropped only 5 percent in 1959 despite the introduction of natural gas into Ontario in late 1958 and a sharp rise in oil consumption in eastern Canada. As an example of the latter, The Dominion Bureau of Statistics reported that sales of Nos. 2 and 3 heating oils in Ontario and Quebec, rose from 29.5 million barrels in 1955 to 44.1 million barrels in 1959. Between 1958 and 1959 alone, sales of heating oils gained 5.3 million barrels in these Provinces. Apparently the relative strength of Canadian demand for imported fuels, both anthracite and petroleum, was attributable to the booming Canadian economy and the Springhill mine disaster in November 1958

[4] Figures on imports and exports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the Bureau of the Census.

Digitized by Google

which seriously curtailed bituminous-coal output in Nova Scotia. Virtually all of the anthracite shipped to Cuba is consigned to the U.S.-owned nickel plant at Nicaro where a small quantity is used for sintering and the remainder for gas production.

The factors that have limited exports of Pennsylvania anthracite to Europe in recent years resulted in a further loss in 1959. The increasing use of petroleum, excessive mine stocks of coal, competition from Russian anthracite, the development of natural-gas reserves in France and Italy, and, Government-supported domestic production in some countries combined to reduce European imports of anthracite from the United States below 200,000-tons in 1959. Although no size data are available from the Bureau of the Census on this tonnage, information from other sources indicates that the bulk comprised low-priced Buckwheat sizes, principally Buckwheat No. 4 and smaller. In Europe, these sizes are used primarily for generating steam and manufacturing fuel briquets.

Exports to Asia were marked by a 40,000-ton decline in shipments to Viet-Nam and an increase of 12,000 tons in exports to Israel.

According to the Trade and Navigation of the United Kingdom, British anthracite exports declined from 1,079,825 metric tons in 1958 to 826,545 metric tons in 1959. Destination data are not presently available on British exports by type of coal; however, as Canada reported increased imports of Welsh anthracite, most of the decline undoubtedly was in shipments to Britain's traditional European anthracite markets.

According to official data released in the Foreign Trade of the U.S.S.R., Russia exported 1,839,000 metric tons of anthracite in 1959, a small decrease from the 1,891,000 tons reported by the Economic Commission for Europe in 1958. Of this total, 1,457,000 metric tons went to free world nations, as follows: France, 719,000 tons (703,000 in 1958); Italy, 331,000 tons (253,000 in 1958); Finland, 172,000 tons (264,000 in 1958); Yugoslavia, 93,000 tons; Netherlands, 57,000 tons (39,000 in 1958); Belgium, 44,000 tons (69,000 in 1958); Sweden, 21,000 tons; Japan, 13,000 tons; Tunisia, 4,000 tons; Iceland, 2,000 tons; and Greece, 1,000 tons. Among Soviet bloc countries, East Germany was the largest importer with 356,000 metric tons (422,000 in 1958). Poland imported 17,000 tons; Czechoslovakia, 7,000 tons; Hungary, 1,000 tons; and other countries, 1,000 tons. A sizable increase is expected in 1960 in the movement of Russian anthracite to Italy. Under the terms of a 1960 protocol, Italy agreed to import 550,000 metric tons, 100,000 tons of which will consist of low-grade anthracite fines.

Based on data published in the Annual Return on the Foreign Trade of Japan, that country held 1959 imports of anthracite at approximately the 1958 level, taking 519,000 metric tons compared with 505,000 tons in 1958. Principal suppliers were North Viet-Nam, 351,000 metric tons; Canada, 61,000 tons (the classification of this coal is doubtful because the Dominion does not report the production of any anthracite in Canada); Republic of Korea, 60,000 tons; and the U.S.S.R., 21,000 tons. The same source reported that Japan received 5,236 tons from the United States and small quantities from India and South Africa.

Digitized by Google

According to the Bureau of the Census, only 95 tons of anthracite was imported into the Eastern United States in 1959, 7 tons of Welsh anthracite through the St. Lawrence customs district and 88 tons from the Republic of Korea through New York. Canada continued to ship a small amount of coal (2,538 tons), classified as anthracite, into the State of Washington; however, as indicated in previous years, this coal is thought to have been either bituminous or semianthracite from the Province of Alberta. Table 39 presents 1958–59 data on imports of anthracite into the United States, and table 40 gives data on exports by country of destination and customs district.

TABLE 39.—Anthracite imported for consumption in the United States, 1958–59, by countries and customs districts, in net tons

[Bureau of the Census]

Country	1958	1959	Customs district	1958	1959
North America:			North Atlantic:		
Canada	4,363	2,538	Washington	4,363	2,538
United Kingdom		7	St. Lawrence		7
Korea, Republic of		88	New York		88
Total	4,363	2,633	Total	4,363	2,633

TABLE 40.—Anthracite exported from the United States, 1958–59, by countries and customs districts, in net tons

[Bureau of the Census]

Country	1958	1959	Customs district	1958	1959
North America:			North Atlantic:		
Canada	1,522,408	1,453,228	Connecticut	41	
Costa Rica		100	Maine and New Hampshire	22	16
Cuba	34,257	89,681	Massachusetts	30	
Dominican Republic		35	New York	1,552	17,576
Mexico	1,019	1,488	Philadelphia	798,641	441,432
Trinidad and Tobago		56	South Atlantic:		
Total	1,557,684	1,544,588	Maryland	473	
South America:			Virginia	1,491	3,209
Argentina		3,099	Gulf Coast:		
Brazil	19,640	8,818	Mobile	51	35
Chile	25		Sabine		1,693
Colombia	10		Mexican border: Laredo	1,019	1,218
Venezuela	46	5	Northern border:		
Total	19,721	11,922	Buffalo	968,688	840,880
Europe:			Dakota	50	
France	333,792	117,519	Duluth and Superior	1,591	2,003
Greece	9,103		Michigan	897	905
Italy	73,335	48,243	Ohio	8,140	12,822
Netherlands	219,834	18,114	Rochester	2,443	20,282
Norway	93		St. Lawrence	467,496	429,687
Sweden		15	Vermont	20,791	14,560
Trieste	4,100	10,712	Miscellaneous [1]	6,443	1,240
Total	640,257	194,603	Total	2,279,859	1,787,558
Asia:					
India		1,715			
Israel	10,769	23,032			
Japan	348				
Nansei and Nanpo Islands		37			
Viet-Nam	51,080	11,661			
Total	62,197	36,445			
Grand total	2,279,859	1,787,558			

[1] District breakdown not available.

Digitized by Google

WORLD PRODUCTION

World production of anthracite totaled 186,000,000 net tons in 1959, a gain of 6 percent over the revised total for 1958. The most significant development during 1959 took place in China, where the 1958 output was doubled as part of an intensive campaign to develop the country's reserves of mineral fuels. Another development of interest was the substantial increase in output recorded by the Republic of Korea where, under the stimulus of aid from the United States, anthracite production increased threefold from 1955 to 1959. Significantly, the gain in Chinese production equaled the net gain in world production; hence, output in the rest of the world generally continued at 1958 levels; small increases in some countries being balanced by small losses in others. Table 41 presents details on world production, by countries, 1955–59.

TABLE 41.—World production of anthracite, 1955–59, by countries, in thousand short tons [1]

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country	1955	1956	1957	1958	1959
Belgium	7,947	7,675	9,827	7,541	7,059
Bulgaria	132	137	[2] 150	[2] 165	[2] 165
China [2]	5,000	5,500	5,700	11,000	22,000
France	12,031	12,466	10,860	12,235	12,125
Germany:					
East [2]	275	275	275	275	275
West	12,378	13,453	13,338	[2] 13,800	[2] 13,200
Ireland	154	182	183	186	164
Italy	53	60	61	49	34
Japan	1,495	1,561	1,852	1,811	1,781
Korea:					
North [2]	1,300	1,500	1,600	2,100	2,200
Republic of	1,442	2,001	2,691	2,944	4,559
Morocco: Southern Zone	515	531	574	562	513
Netherlands [2]	4,400	4,400	4,300	4,400	4,400
New Zealand	2	2	2	2	[2] 2
Peru	18	18	19	62	64
Portugal	445	456	550	625	581
Rumania	22	12	[2] 17	[2] 17	[2] 17
Spain	2,159	2,507	3,129	3,441	[2] 3,100
Switzerland [2]	11	11	11	11	11
Union of South Africa [3]	413	463	[2] 485	546	656
U.S.S.R.	66,974	74,118	79,953	86,121	[2] 86,000
United Kingdom	4,894	4,662	4,476	4,363	[2] 4,200
United States (Pennsylvania)	26,205	28,900	25,338	21,171	20,649
Vietnam:					
North	1,213	1,340	1,200	1,650	[2] 2,200
South	----------	2	13	22	22
World total (estimate) [1]	149,500	162,200	166,600	175,100	186,000

[1] This table incorporates some revisions. Data do not add to totals shown because of rounding where estimated figures are included in the detail.
[2] Estimate.
[3] Reported as sales.

NOTE: An undetermined amount of semianthracite is included in the figures for some countries.

TECHNOLOGY

Improvements in the mining, preparation, and utilization of anthracite, through basic and applied research, lead to lower costs, better products, expansion of current uses, and the development of new uses.

Mining.—Mechanization of anthracite mining operations was investigated by the Bureau of Mines in cooperation with anthracite

Digitized by Google

producers in two full-scale research projects. One project, in which Bureau equipment was used, was on a 300-foot longwall face; the other was the adaptation of company-owned mechanical mining equipment of special design to a sublevel-caving method of mining.

The longwall face had been established in 1958 by undercutting and blasting in a 7-foot-thick bed on a 15° to 20° pitch. Trial runs with the Eickhoff drum-cutter loader (Anderton type) on the longwall demonstrated that the machine would cut and load anthracite satisfactorily. However, the original dust-allaying system was inadequate and was replaced by a system of 10 water sprays supplied with 15 gallons of water per minute at 500 pounds pressure. The new spray system and an increase to 300 feet per minute in the velocity of the ventilating air provided satisfactory working conditions. The best operational cycle attained on the longwall was a 2-foot advance per working day of two shifts. This worktime included operation of the cutting-loading machine and movement of roof supports and equipment. For five successive cuts, 900 tons of coal was produced at an average of 8.6 tons per man-shift. Cutting and loading coal required 57 percent of the worktime, and roof-support consumed the remainder.

Support of the heavy sandstone roof was a continuing problem on the longwall because of pressure waves that occurred about every 30 feet of face advance. The concentration of the yielding-steel props was increased 53 percent, and the supported roof area was decreased 33 percent. To improve performance of the yielding-steel supports, the height of the friction beads and the travel distance of the pressure-shoe on the props were increased. However, some props still failed to meet load requirements. The longwall project was stopped late in 1959 owing to operational problems and because its location interfered with mining activity in adjacent sections of the mine.

The mechanized sublevel-caving project was designed to develop the full capabilities of a borer-trimmer-type of continuous-mining machine, a 2-foot underground auger equipped with a 4-foot reamer, mobile loaders, conveyors, and auxiliary equipment. The machinery was used in an anthracite bed 30 feet thick with a pitch of 20° to 45°. The borer was used to drive gangways 800 feet long, with 35-foot pillars between roads. The 2-foot auger bored crosscuts between gangways for ventilation, and some holes later were reamed to a 4-foot diameter for use as manways. After this development work, the mobile loaders and conveying equipment were placed in the completed gangways, and the pillars were mined by modified long-hole blasting and caving. Over a 12-month period, the mechanized section produced 122,000 tons of coal at a productivity rate of 20.4 tons per man-shift. The roof in the 8- by 12-foot borer-driven roads was supported by lightweight, four-piece, steel yielding arches. Roof control became a serious problem in the coal gangways owing to orogenic pressures and pressure waves set up by borer operation and the overlying weight and hydrostatic pressures. These conditions finally caused withdrawal of the equipment and termination of the research early in 1960.

Laboratory and pilot-scale research by the Bureau on the vertical hydraulic transportation of solid materials in a pipeline revealed that

Digitized by Google

the sinking velocities of coal, slate, and rock in a confined water column are influenced principally by the shape of the solid. Moderate variations in size or specific gravity influence settling rates only to a small degree. Tests with a centrifugal pump designed to pass solids with diameters up to 1¾ inches demonstrated that Chestnut-size anthracite can be transported in a vertical pipe (6-inch-diameter) at a rate of 27 pounds per second with a water velocity of 8 feet per second.

Recommended standards [5] for using alternating current in coal mines have been established by the Bureau. The need for information on the best methods of using and installing alternating-current power systems and equipment arose from the trend toward greater utilization of such equipment in coal mines.

The use of a long-hole mining method, combined with chain-conveyor slope haulage, in steeply-pitching (75° to 85°) beds at an anthracite mine was described.[6] The holes, 30 to 60 feet long, are drilled with rotary air-drills using 1¾-inch coal bits. An average daily output of 12.6 tons per miner was achieved during an entire year.

A wide variety of equipment [7] was used in stripping three anthracite beds to a maximum depth of 260 feet at a coal-rock ratio of 1:6.5. The first 60 feet of overburden was removed, without blasting, by bulldozers and carryalls. The succeeding 120 feet was removed by drilling and blasting in four benches 30-feet high, then loaded by electric shovels into diesel trucks. The final 80 feet was removed in blocks by drilling and blasting, with subsequent removal by a 9-yard, diesel, walking dragline. Blastholes were drilled by a crawler-type rotary unit using tri-cone bits.

A comprehensive review [8] of the development and use of ammonium nitrate as a blasting agent in open pits describes the various types and mixtures in use. The different techniques of mixing the nitrate with sensitizers and charging the material in blastholes are reported. Methods of varying the sensitivity, density, and detonation velocity of the mixtures and slurries are described. New developments in detonating boosters also are given.

Mine-Water Control.—Thirteen projects have been completed under the Federal-State program begun in 1955 to control water in anthracite mines. Nine other projects were in various stages of construction or undergoing final tests at the end of 1959. Ten projects required a total of 29 deep-well pumps with an aggregate capacity of 143,000 gallons per minute to control the level of underground water pools. The remaining 12 projects provided such surface-drainage improvements as the backfilling of old strip pits and the construction of ditches and flumes to prevent water from seeping into the underlying mine workings.

In 1959, five mine-water control projects were approved for Federal participation. One project, a pumping installation, was cancelled during the year; three were surface-drainage improvements, and one was a pumping project.

---

[5] Health and Safety Staff, Recommended Standards for Alternating Current in Coal Mines: Bureau of Mines Inf. Circ. 7962, 1960, 25 pp.
[6] Mechanization, Long-Hole Mining in Pitching Seams: Vol. XXIII, No. 5, May 1959, pp. 51–53.
[7] Hunt, J. W., Stripping to a 260-Foot Depth: Mechanization, Vol. XXIII, No. 6, June 1959, pp. 73–76.
[8] Cook, Melvin A., Ammonium Nitrate Explosives: Min. Cong. Jour., Vol. 45, No 10, October 1959. pp. 57–62 and 107.

Digitized by Google

On January 22, 1959, the Susquehanna River, in flood stage, broke into mine workings near Wilkes-Barre, Pa. By the time the breakthrough was plugged, the river waters had spread through adjacent mines and flooded workings underlying about five square miles of surface area. Emergency funds, made available by a disaster proclamation, were used to marshal pumping equipment from the mine-water control program and to obtain other large-capacity pumps to unwater the flooded mines. This large underground pool was lowered nearly 300 feet by the Commonwealth of Pennsylvania in order to carry out recovery operations and permanently seal the breakthrough point. When operations were completed in July, all emergency pumping was stopped and the water allowed to rise in the affected mines. This flood disaster materially changed the underground water conditions in the Wyoming basin of the Northern anthracite field, and the mine-water control program was being adjusted to the new conditions as rapidly as they became known.

Preparation.—In Bureau of Mines research on the effect of particle size on ash content, samples of anthracite containing less than 0.5 percent ash were prepared without resorting to chemical solution of the ash. One sample with 0.25 percent ash was prepared for further study by a coal-chemicals manufacturer. Another sample with less than 1.0 percent ash was prepared to investigate the use of low-ash anthracite in carbon electrodes for aluminum smelting.

Evaluation of the Bureau's air-swept conical ball mill for producing ultrafine material revealed that anthracite can be reduced to about 4 microns at low production rates. Sizing analysis was investigated, and a procedure developed for measuring sizes down to 0.4 micron.

At a commercial anthracite preparation plant,[9] medium density is controlled automatically by radioactive means at a predetermined or set specific gravity. The amount of radiation from a radioisotope, received through the medium by a detector, varies an electric current, which actuates motorized valves, or feed units, to maintain the set specific gravity.

The heavy-medium cyclone coal-washing system developed by the Dutch State Mines[10] is being accepted in many countries. Early in 1959, plants with a capacity of 1,400 tons per hour were in operation, and other plants with a total capacity of 1,500 tons per hour were under construction. The centrifugal acceleration of the cyclone can be as much as 20 times greater than gravitational acceleration; hence, the separation of the coal from the impurities takes place rapidly. Medium density, obtained with magnetite (Grade B), is controlled automatically and can be held constant within a range of 0.003. A claimed advantage of the system is that the quality of separation is not affected by wide variations in load.

Various methods of drying coal thermally were described and classified.[11] The equipment used and new developments are described.

---

[9] Mechanization, Radioactivity Comes to Coal Preparation: Vol. XXIII, No. 5, May 1959, pp. 54–56.
[10] Krijgsman, Dr. C., The Dutch State Mines Heavy Medium Cyclone Washing System: Pt. I, Min. Cong. Jour., Vol. 45, No. 5, May 1959, pp. 47–52; pt. II, Min. Cong. Jour., Vol. 45, No. 6, June 1959, pp. 91–93.
[11] Zachar, F. R., Recent Advances in Coal Thermal Drying: Min. Cong. Jour., Vol. 45, No. 1, January 1959, pp. 32–36 and 49.

Digitized by Google

A new type of coal dryer is reported [12] to have increased cleaning-plant efficiency, lowered operating and maintenance costs, and improved the product. The coal-fired rotary-kiln system reduces moisture of minus-2-inch feed from 15 to 2 percent.

New preparation equipment, [13] with a capacity of 963 tons per hour, was installed or contracted for at 10 anthracite preparation plants in 1959. Two of the plants installed radioactive equipment to control medium density in heavy-medium systems. There are two types of nucleonic density-controls for heavy-medium systems available commercially. Other newly introduced preparation equipment includes rubber-coated screens that are claimed to wear longer than conventional screens.

Utilization.—Radiation research by the Bureau indicated some changes in the properties of anthracite samples exposed to neutron and gamma radiation. The neutron-irradiated anthracite had lower electrical resistivity and higher resistance to mechanical grinding than untreated material. The research also indicated that neutron radiation caused a slight swelling of the particle size in the 60- to 140-mesh range. Neutron-induced activity was observed in all irradiated anthracite samples.

The surface area and reactivity of the gamma-irradiated anthracite did not differ systematically from values for comparable material exposed to neutron radiation. Magnetic resonance data indicated that gamma radiation caused an increase in the free radical content of the anthracite,

The Bureau's gasification research program at its Anthracite Research Center, Schuylkill Haven, Pa., is directed toward determining the rate and extent of reaction and the variables affecting the reaction of hydrogen with anthracite at elevated temperatures and pressures. Process calculations and design studies have been made for a small-scale gasification unit to study the reaction of hydrogen with anthracite at temperatures up to 1,472° F. and pressures up to 6,000 pounds per square inch.

Continued research by the Bureau on briquetted anthracite metallurgical fuel was concerned with the effects on briquet strength caused by varying the ingredients of the mix and the calcining rate. The proportion of anthracite smaller than 200-mesh in the briquet mix must be limited carefully to maintain a low pitch requirement. With the bituminous coal used in the mix, the optimum size was determined to be between 20- and 200-mesh. Larger material produced briquets with low ASTM tumbler stability, and material smaller than 200-mesh caused mixing difficulties. Additional research on briquetting pressures confirmed the optimum pressure to be 3,000 pounds per square inch. Both pillow- and bolster-shaped briquets have been produced without difficulty in the pilot-scale plant at a rate of 3,000 pounds per hour. Empirical tests showed the strength of the pilot-plant briquets to be satisfactory and substantially the same as those of laboratory briquets.

[12] Coal Age, Low-Cost Thermal Drying, Increased Plant Efficiency, Quality Products: Vol. 64, No. 11, November 1959, pp. 118–119.
[13] Coal Age, Mining, Stripping, Preparation in 1959: Vol. 65, No. 2, February 1960, pp. 80–86.

Digitized by Google

Laboratory studies showed that raw briquets can be charged for calcining without excessive deformation at temperatures as high as 1,000° F. It also was determined that increases in the rate of heating from 10° to 30° F. per minute had no adverse effects on briquet quality. The Bureau's pilot, vertical-shaft calciner was investigated as a calcining unit for processing metallurgical briquets. The calciner did not operate satisfactorily owing to insufficient preheat and erratic discharge.

Pillow- and bolster-shaped briquets were tested in a simulated metallurgical stock column to determine the effects of size and shape on airflow. The pressure drop per foot of pillow briquets ranged from 1.32 to 1.42 inches of water at an air rate of 2,975 cubic feet per minute. Under the same conditions, the pressure drop with bolster briquets ranged from 0.96 to 1.13 inches of water per foot of bed. Pressure-drop measurements across the bed revealed that wall effect was insignificant.

Tests of calcined anthracite as a fuel in a modern, commercial, iron-melting foundry cupola showed that the operation was less flexible and the metal temperatures were not as high with calcined anthracite as with plus-4-inch foundry coke.

The process-flow diagram for manufacturing chemicals from anthracite in a proposed large plant near Pottsville, Pa., was described.[14] As planned, anthracite would be a raw material for the production of calcium carbide and for the feed to a Lurgi-type gasification process. Synthesis gas would be produced for conversion to chemicals. Anthracite would be used to generate steam for process requirements and to make electricity.

[14] Coal Age. Anthracite Takes Lead in Making Chemicals Directly from Coal: Vol. 64, No. 7, July 1959, pp. 98-100.

Digitized by Google

Coke and Coal Chemicals

By J. A. DeCarlo,[1] T. W. Hunter,[2] and Maxine M. Otero[3]

Contents

	Page
General summary	187
Salient statistics	190
Statistical summary	191
Scope of report	193
Oven and beehive coke and breeze	194
Monthly production	194
Production by merchant and furnace plants	195
Production by States	196
Coke breeze	196
Number and type of ovens	197
Capacity of oven-coke plants	202
Quantity and value of coal carbonized	203
Preparation and source of coal	206
Consumption of coke	210
Oven and beehive coke and breeze—Continued	
Distribution of oven and beehive coke	212
Stocks of coke and coking coal	213
Assigned value and price	216
Foreign trade	219
Technology	220
World review	227
Coal-chemical materials	230
General summary	230
Coke-oven gas	232
Crude coal tar and derivatives	235
Coke-oven ammonia	237
Crude light oil and derivatives	240
Coke ovens owned by city gas companies	245

GENERAL SUMMARY

PRODUCTION of coke increased 4 percent over 1958 but was 21 percent below the output in 1947–49 (table 1). The increase was achieved despite the 116-day steel strike which forced nearly all furnace oven-coke plants to bank their ovens or operate them at greatly reduced rates. Oven-coke plants operated at a high rate through June, and production at furnace and merchant plants averaged 91 and 70 percent of capacity, respectively. The steel strike, beginning July 15, drastically reduced coke output, and furnace plants operated at only 21 percent of capacity until the strike ended on November 7. The tremendous drop in requirements of blast-furnace coke reduced purchases from merchant plants, and the rate of production of merchant plants for the July–November period averaged about 60 percent of capacity. Coke production rose rapidly after work was resumed in November. By the end of the month, furnace plants were operating at about 80 percent of capacity and merchant plants had increased their operating rate about 10 percentage points. In December, production rates continued to climb, and by yearend furnace plants were producing at about 90 percent of capacity and

[1] Chief, Section of Coke and Coal Chemicals.
[2] Chief, Branch of Bituminous Coal Economics.
[3] Supervisory Statistical Assistant.

Digitized by Google

merchant plants at 73 percent, the highest production rate since February 1959 for the latter. Slot-type ovens supplied 98 percent of the coke produced in 1959.

Production of beehive coke in 1959 was nearly double that in 1958, mainly because of the strong demand for blast-furnace fuel during the first 6 months. Beehive production did not recover after the strike as did oven-coke output and the December 1959 production was only 76 percent of the average monthly output for the first 6 months. One of the factors that hampered beehive production in December was the large stocks of oven coke that had accumulated at many of the furnace plants during the strike. Stocks of coke at furnace plants nearly doubled between June 30 and November 30. Stocks of coke at merchant plants rose more than half a million tons or 40 percent during the same period. An alltime peak, slightly above 5 million tons, was established in November. This large reserve of coke, particularly at furnace plants, reduced the need for beehive coke.

The apparent consumption of coke for all purposes in the United States rose 4 percent over the 1958 total but was 23,425,820 tons or 30 percent below the record set in 1951. As in preceding years, iron blast furnaces consumed 89 percent of the national coke consumption; iron and steel foundries, 5 percent; producer- and water-gas manufacture, less than 1 percent; other industrial uses (nonferrous smelt-

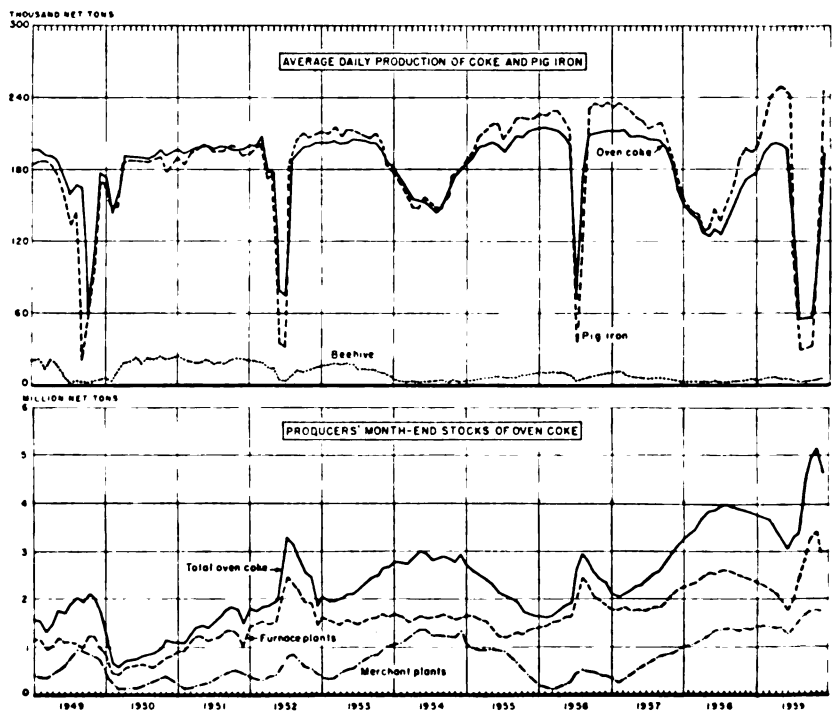

FIGURE 1.—Average daily production of oven and beehive coke and pig iron and producers' stocks of oven coke, 1949–59, by months.

Digitized by Google

ing, chemical processing, rock wool manufacture, etc.), 4 percent; residential heating, 1 percent; and exports, 1 percent. The quantities used in metallurgical applications (blast furnace and foundry) and for other industrial purposes increased, whereas less coke was used to manufacture gas and for residential heating.

Production of coke screenings or breeze increased 2 percent in 1959. Until recently this material was used almost exclusively as a power-plant fuel. In recent years, however, outlets for breeze have changed, principally because of increased demand for breeze in agglomerating iron ore and smelting phosphate rock. In 1959, only 32 percent of the breeze output was used for raising steam; 26 percent was used in agglomerating plants at iron and steel works; and 38 percent was used or sold for miscellaneous industrial applications, including the manufacture of elemental phosphorus. The increased demand for breeze stimulated prices, and the average value per ton of breeze sold was 98 percent higher than in 1947–49. Most of the breeze used in phosphate furnaces in the Western States and Florida was shipped by rail over great distances, which added considerably to the delivered price of breeze at these installations.

The average value per ton of coal delivered to coke plants is important, because coal costs represent a major part of the total cost of manufacturing coke. The cost of coal delivered to coke plants decreased slightly in 1959, declining from $9.84 to $9.80. This decline in coking-coal costs was an outstanding accomplishment of the bituminous-coal industry. Although the cost of mining and transporting coal increased in 1959, the average value of coal delivered to oven-coke plants was lower because installations of mechanical equipment at coal mines increased productivity which in turn kept mine prices stable.

There was little construction activity at oven-coke plants in 1959; only two new and one rebuilt batteries were completed and placed in operation. The ovens taken permanently out of production outnumbered the new ovens completed. The number of slot-type ovens in existence on December 31 was 251 less than at the beginning of the year, and annual coke capacity declined 1,050,200 tons. Only 118 new slot-type ovens were under construction at the end of the year. A significant development was the construction of new beehive-coke ovens. A completely new, mechanized beehive-coke plant was placed in operation near Big Stone Gap, Va., by Stonega Coke and Coal Co. The Sharon Steel Corp. started construction of 264 beehive-coke ovens at Templeton, Pa., 12 miles north of Kittanning, and another company announced plans for constructing a new beehive-coke plant in 1960 near Dorchester, Va. The high construction cost of slot-type coke ovens and auxiliary equipment and vigorous competition of petrochemical producers for markets for their chemical products were contributing factors in the renewed interest in beehive coking.

Although slot-type ovens carbonized 1,907,081 more tons of coal in 1959 than in 1958, production of ammonia, tar, and light oil decreased, whereas gas output increased. The output of the basic chemical raw materials declined because the yields of all of these products were lower. The reduced output of the basic chemical products also reduced production of the principal derivatives of tar, light oil, and

Digitized by Google

ammonia. There was only limited production of coal chemicals during the steel strike. The strike did not cause any shortages of tar and light oil products such as creosote oil, benzene, toluene, and xylene, but supplies of naphthalene became critical. Unlike benzene, toluene, and xylene, which were produced in large volume by the petroleum industry, the sole source of naphthalene was coal carbonization in the United States and abroad. Imports of crude naphthalene from European countries averaged over 90 million pounds for the years 1955–58 and totaled only 59 million pounds in 1959. Although naphthalene requirements were expected to increase steadily in future years, imports might be greatly reduced because of rapidly rising requirements abroad. The uncertainty of imports and the expected substantial increase in future requirements directed attention to petroleum as another source of supply. During the past several years, several petroleum companies have conducted research and laboratory studies to develop processes to produce petroleum naphthalene, and one company was planning to construct a large commercial plant early in 1960.

Another coke-oven product that was of grave concern to coke-oven operators in 1959 was coke-oven sulfate. This ammonia product and ammonia liquor supplied coke producers with the greatest income of all coal-chemical materials in 1920 because of the high unit prices then prevailing. The spectacular rise in synthetic ammonia output since 1920 influenced prices of nitrogen products, and prices of coke-oven ammonia products have decreased about 58 percent since that time. In 1959 many coke-oven sulfate producers indicated that they were unable to recover manufacturing costs when selling their product at competitive prices. Other factors that made it more difficult for the coke producers to market their ammonium sulfate

TABLE 1.—Salient statistics of the coke industry in the United States, 1947–49 (average) and 1958–59

	1947–49 (average)	1958	1959
Coke produced:			
Oven.....net tons	65,088,462	53,005,730	54,789,276
Beehive.....do	5,559,940	598,372	1,074,296
Total.....do	70,648,402	53,604,102	55,863,572
Producers' stocks of coke, Dec. 31.....do	[1] 1,769,456	3,823,364	4,682,436
Imports, all coke form coal.....do	181,000	121,517	123,255
Exports, all coke from coal.....do	696,502	392,817	460,222
Apparent consumption, all coke.....do	69,852,671	52,658,214	54,667,533
Ovens:			
Slot-type, in existence Dec. 31	[1] 15,104	16,244	15,993
Annual coke capacity, Dec. 31.....net tons	[1] 73,710,100	82,497,900	81,447,700
Beehive, in existence Dec. 31	[1] 13,662	8,682	7,448
Annual coke capacity, Dec. 31.....net tons	[1] 8,672,200	5,020,400	4,368,800
Coal-chemical materials produced:			
Tar, crude.....gallons	715,778,985	669,316,299	653,728,164
Ammonia products [2].....net tons	896,603	739,240	716,703
Gas.....M cubic feet	949,474,911	789,828,396	804,600,058
Crude light oil.....gallons	246,607,287	218,229,276	213,036,193
Value of coal-chemical materials used or sold	$254,681,622	$299,878,695	$288,153,722
Value of coke and breeze produced	867,047,809	999,880,954	1,017,789,999
Total value of all products	1,121,729,431	1,299,759,649	1,305,943,721

[1] 1949.
[2] Includes ammonium sulfate, ammonia liquor (NH_3 content), ammonium thiocyanate, and di- and mono-ammonium phosphate.

Digitized by Google

TABLE 2.—Statistical summary of the coke industry in the United States in 1959

	Slot-type ovens	Beehive ovens	Total
Coke produced:			
At merchant plants:			
Net tons	6,849,786	(2)	(2)
Value	$146,063,542		
At furnace plants: [1]			
Net tons	47,939,490		
Value	$830,280,344		
Total:			
Net tons	54,789,276	1,074,296	55,863,572
Value	$976,343,886	$15,740,926	$992,084,812
Breeze produced:			
Net tons	3,710,968	74,217	3,785,185
Value	$25,549,658	$155,529	$25,705,187
Coal carbonized:			
Bituminous:			
Net tons	77,354,077	1,827,474	79,181,551
Value	$764,215,556	$11,152,140	$775,367,696
Average per ton	$9.88	$6.10	$9.79
Anthracite:			
Net tons	368,830	----	368,830
Value	$3,860,098	----	$3,860,098
Average per ton	$10.47	----	$10.47
Total:			
Net tons	77,722,907	1,827,474	79,550,381
Value	$768,075,654	$11,152,140	$779,227,794
Average per ton	$9.88	$6.10	$9.80
Average yield in percent of total coal carbonized:			
Coke	70.49	58.78	70.22
Breeze (at plants actually recovering)	4.78	6.23	4.80
Coke used by producing companies:			
In blast-furnace plants:			
Net tons	45,836,378	47,430	45,883,808
Value	$793,254,313	$812,020	$794,066,333
In foundries:			
Net tons	225,968	----	225,968
Value	$7,197,915	----	$7,197,915
For producer-gas manufacture:			
Net tons	93,374	----	93,374
Value	$1,586,512	----	$1,586,512
For water-gas manufacture:			
Net tons	84,669	----	84,669
Value	$1,337,911	----	$1,337,911
For other industrial uses:			
Net tons	486,846	----	486,846
Value	$8,860,838	----	$8,860,838
Coke sold (commercial sales):			
To blast-furnace plants:			
Net tons	2,783,159	750,247	3,533,406
Value	$44,300,754	$11,351,079	$55,651,833
To foundries:			
Net tons	2,455,484	8,396	2,463,880
Value	$74,478,101	$135,985	$74,614,086
To water-gas plants:			
Net tons	48,362	1,261	49,623
Value	$878,287	$16,393	$894,680
To other industrial plants:			
Net tons	1,460,956	266,730	1,727,686
Value	$23,005,078	$3,426,592	$26,431,670
For residential heating:			
Net tons	472,458	1,030	473,488
Value	$8,137,880	$15,042	$8,152,922
Disposal of breeze:			
Used by producing companies:			
In steam plants:			
Net tons	1,209,412	----	1,209,412
Value	$7,180,876	----	$7,180,876
In agglomerating plants:			
Net tons	982,799	----	982,799
Value	$7,424,811	----	$7,424,811
For other industrial uses:			
Net tons	458,003	----	458,003
Value	$2,705,896	----	$2,705,896
Sold (commercial sales):			
Net tons	899,956	85,508	985,464
Value	$7,211,782	173,474	$7,385,256

See footnotes at end of table.

Digitized by Google

TABLE 2.—Statistical summary of the coke industry in the United States in 1959—Continued

	Slot-type ovens	Beehive ovens	Total
Average receipts per ton sold (commercial sales):			
Blast-furnace coke	$15.92	$15.13	$15.75
Foundry coke	$30.33	$16.20	$30.28
Water-gas coke	$18.16	$13.00	$18.03
Other industrial coke	$15.75	$12.85	$15.30
Residential heating coke	$17.22	$14.60	$17.22
Breeze	$8.01	$2.03	$7.49
Coal-chemical materials:			
Yield per ton of coal:			
Tar, crude—gallons	8.41		8.41
Ammonia products [3]—pounds	18.70		18.70
Gas—M cubic feet	10.35		10.35
Crude light oil—gallons	2.81		2.81
Commercial sales:			
Tar, crude—gallons	334,716,614		334,716,614
Value	$42,633,118		$42,633,118
Ammonia products [3]—net tons	758,578		758,578
Value	$25,746,818		$25,746,818
Gas (surplus)—M cubic feet	514,970,524		514,970,524
Value	$123,123,822		$123,123,822
Crude light oil and derivatives [4]—gallons	186,378,452		186,378,452
Value	$48,171,365		$48,171,365

[1] Plants associated with iron blast furnaces (refer to definition in Scope of Report).
[2] Not separately recorded.
[3] Includes ammonium sulfate, ammonia liquor (NH_3 content), ammonium thiocyanate, and di- and mono-ammonium phosphate.
[4] Includes intermediate light oil.

were the use of ammoniating solutions in preference to ammonium sulfate, a steadily expanding market for anhydrous ammonia and ammonia solutions for direct application to soils, and the tremendous gain in production of synthetic ammonium sulfate.

The total value of carbonized coal was slightly more than $779 million in 1959. The value of all coal chemicals used and/or sold

TABLE 3.—Summary of oven-coke operations in the United States in 1959, by States

State	In existence Dec. 31 [1]		Coal carbonized (net tons)	Yield of coke from coal (percent)	Coke produced (net tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Alabama	7	1,488	6,728,381	72.79	4,897,884	$96,476,915	$19.70
California, Colorado, and Utah	4	860	3,728,579	61.99	2,311,248	57,105,887	24.71
Illinois	6	507	2,984,483	68.52	2,044,977	37,792,888	18.48
Indiana	5	2,191	9,575,999	71.98	6,892,972	118,009,645	17.12
Kentucky, Tennessee, and Texas	4	380	2,453,771	71.17	1,746,449	30,293,063	17.35
Maryland	1	758	3,172,447	75.72	2,402,312	(2)	(2)
Massachusetts	1	108	493,313	68.59	338,387	(2)	(2)
Michigan	4	769	4,426,269	73.77	3,265,252	60,750,009	18.60
Minnesota	3	241	998,756	69.64	695,536	14,475,829	20.81
New Jersey	1	230	845,365	72.75	615,001	(2)	(2)
New York	3	830	4,373,476	69.67	3,046,813	51,511,184	16.91
Ohio	14	2,390	12,445,985	71.03	8,840,750	147,945,010	16.73
Pennsylvania	14	4,133	19,880,636	69.19	13,755,846	227,773,358	16.56
West Virginia	4	742	4,451,915	69.12	3,077,138	50,967,671	16.56
Connecticut, Missouri, and Wisconsin	3	366	1,163,532	73.80	858,711	20,867,045	24.30
Undistributed						62,375,382	18.59
Total 1959	74	15,993	77,722,907	70.49	54,789,276	976,343,886	17.82
At merchant plants	20	2,249	9,568,131	71.59	6,849,786	146,063,542	21.32
At furnace plants	54	13,744	68,154,776	70.34	47,939,490	830,280,344	17.32
Total 1958	77	16,244	75,815,826	69.91	53,005,730	966,794,538	18.24

[1] Excludes plants retired permanently during year.
[2] Included with "Undistributed" to avoid disclosing individual company figures.

Digitized by Google

TABLE 4.—Summary of beehive-coke operations in the United States in 1959, by States

State	In existence Dec. 31 [1]		Coal carbonized (net tons)	Yield of coke from coal (percent)	Coke produced (net tons)	Value of coke at ovens	
	Plants	Ovens				Total	Per ton
Pennsylvania	35	6,080	1,140,511	62.52	713,150	$10,415,475	$14.60
Kentucky, Virginia, and West Virginia	10	1,368	686,963	52.57	361,146	5,325,451	14.75
Total 1959	45	7,448	1,827,474	58.78	1,074,296	15,740,926	14.65
Total 1958	53	8,682	1,015,416	58.93	598,372	8,395,199	14.03

[1] Excludes plants retired permanently during year.

and coke and breeze output was $1.3 billion, or 68 percent more than the value of the coal. The value of coke and breeze amounted to nearly 78 percent of the value of all products; coal-chemical materials, including surplus gas, comprised the balance.

SCOPE OF REPORT

This chapter on high-temperature oven and beehive coke and related products continues, through 1959, the annual statistical series of the coke industry begun by the Federal Geological Survey in 1882 and taken over by the Federal Bureau of Mines in 1925. All data, except where otherwise noted, were voluntarily supplied to the Bureau of Mines by coke-producing companies operating in the United States. Only products made in high-temperature slot-type and beehive-coke ovens are included, and products made by other carbonization processes (coal-gas retorts, low-temperature carbonization of coal, and carbonization of residues from refining coal tar and petroleum) are specifically excluded. Before 1958 a table of the salient statistics on low- and medium-temperature carbonization plants in the United States was included, however, these data, although collected by the Bureau of Mines, cannot be published for 1959 because less than three companies were operating commercially. Production of petroleum coke (including catalyst coke) totaled 8 million tons in 1959, and production of coal-tar-pitch coke, as reported to and published by the U.S. Tariff Commission, totaled 23,000 net tons.

In 1959, the Bureau of Mines canvassed 78 oven-coke plants and 1 light-oil plant that refined light oil produced at affiliated coke plants. Of the oven-coke plants canvassed, 72 were active all year, 3 were idle all year (1 was permanently abandoned), and 3 were active part of the year (2 were closed permanently). In the beehive branch of the coke industry, questionnaires were mailed to 41 companies owning 56 plants. Returns showed that only 9 plants operated the entire year, 20 plants were active part of the year, and 23 plants were idle the entire year. Four plants failed to answer the questionnaires and were presumed to be abandoned.

The terms "merchant" and "furnace" plants in this chapter apply only to oven-coke plants. Furnace plants are those that are owned by or financially affiliated with iron and steel companies whose main business is producing coke for use in their own blast furnaces. All other coke plants are classified as merchant. They include those

Digitized by Google

that manufacture metallurgical, industrial, and residential-heating grades of coke for sale on the open market; coke plants associated with chemical companies or gas utilities; and those affiliated with local iron works, where only a small part (less than 50 percent of their output) is used in affiliated blast furnaces.

As used in this chapter, coke refers only to large sizes (usually one-half inch plus), from which smaller sizes (known as breeze) have been screened. Metallurgical coke refers to grades used for smelting and casting ferrous metals in blast furnaces and foundries. The standard unit of measurement in the coke industry is the net or short ton of 2,000 pounds, which is used throughout this chapter.

OVEN AND BEEHIVE COKE AND BREEZE

MONTHLY PRODUCTION

TABLE 5.—Coke produced in the United States and average per day, 1947–49 (average) and 1957–59, by months, in net tons[1]

Month	1947–49 (average)		1957		1958		1959	
	Total	Daily average	Total	Daily average	Total	Daily average	Total	Daily average
Oven coke:								
January	5,875,300	189,500	6,613,200	213,300	4,721,500	152,300	5,555,200	179,200
February	5,393,400	192,600	5,973,300	213,300	4,046,700	144,500	5,458,200	195,000
March	5,775,800	186,300	6,639,700	214,200	4,309,000	139,000	6,285,500	202,700
April	5,231,600	174,400	6,229,200	207,600	3,809,200	127,000	6,096,600	203,200
May	5,707,400	184,100	6,459,600	208,400	3,870,800	124,900	6,266,900	202,200
June	5,409,700	180,300	6,215,100	207,200	3,897,700	129,900	5,945,500	198,200
July	5,355,900	172,800	6,376,400	205,700	3,935,400	126,900	3,498,100	112,900
August	5,564,400	179,500	6,382,600	205,900	4,283,700	138,200	1,788,800	57,700
September	5,394,700	179,800	6,167,600	205,600	4,458,100	148,600	1,738,900	58,000
October	4,519,000	145,800	6,166,000	198,900	5,053,300	163,000	1,800,700	58,100
November	5,003,500	166,800	5,540,500	184,700	5,183,200	172,800	4,284,000	142,800
December	5,857,800	189,000	5,097,500	164,400	5,437,100	175,400	6,070,900	195,800
Total	65,088,500	178,300	73,860,700	202,400	53,005,700	145,200	54,789,300	150,100
Beehive coke:								
January	623,500	20,100	266,700	8,600	49,400	1,600	80,600	2,600
February	574,900	20,600	254,800	9,100	38,800	1,400	90,000	3,200
March	461,900	14,900	270,400	8,700	41,300	1,300	139,000	4,500
April	445,000	14,800	221,400	7,400	35,700	1,200	159,500	5,300
May	582,300	18,800	182,000	5,800	37,900	1,200	136,200	4,400
June	432,500	14,400	157,200	5,200	46,200	1,600	120,300	4,000
July	304,500	9,800	143,600	4,600	30,400	1,000	66,100	2,100
August	425,000	13,700	157,000	5,100	40,800	1,300	49,900	1,600
September	413,500	13,800	142,700	4,700	56,700	1,900	36,300	1,200
October	428,800	13,800	123,400	4,000	64,700	2,100	37,900	1,200
November	411,700	13,700	90,000	3,000	72,400	2,400	66,100	2,200
December	456,300	14,700	80,800	2,600	84,100	2,700	92,400	3,000
Total	5,559,900	15,300	2,090,000	5,700	598,400	1,700	1,074,300	3,000
Total:								
January	6,498,800	209,600	6,879,900	221,900	4,770,900	153,900	5,635,800	181,800
February	5,968,300	213,200	6,228,100	222,400	4,085,500	145,900	5,548,200	198,200
March	6,237,700	201,200	6,910,100	222,900	4,350,300	140,300	6,424,500	207,200
April	5,676,600	189,200	6,450,600	215,000	3,844,900	128,200	6,256,100	208,500
May	6,289,700	202,900	6,641,600	214,200	3,908,700	126,100	6,403,100	206,600
June	5,842,200	194,700	6,372,300	212,400	3,943,900	131,500	6,065,800	202,200
July	5,660,400	182,600	6,520,000	210,300	3,965,800	127,900	3,564,200	115,000
August	5,989,400	193,200	6,539,600	211,000	4,324,500	139,500	1,838,700	59,300
September	5,808,200	193,600	6,310,300	210,300	4,514,800	150,500	1,775,200	59,200
October	4,947,800	159,600	6,289,400	202,900	5,118,000	165,100	1,838,600	59,300
November	5,415,200	180,500	5,630,500	187,700	5,255,600	175,200	4,350,100	145,000
December	6,314,100	203,700	5,178,300	167,000	5,521,200	178,100	6,163,300	198,800
Grand total	70,648,400	193,600	75,950,700	208,100	53,604,100	146,900	55,863,600	153,100

[1] Daily average calculated by dividing monthly production by number of days in month.

Digitized by Google

PRODUCTION BY MERCHANT AND FURNACE PLANTS

Statistics on production of oven coke at merchant and furnace plants are shown in tables 6 and 7. This series started in 1913 and is maintained so that all who are interested in coal carbonization can follow the development of carbonization in the iron and steel industry.

Since the mid-1950's furnace plants have produced annually about 87 percent of the oven-coke output of the United States. During this period production at merchant plants declined steadily, falling from 9.1 million tons in 1955 to a low of 6.5 million tons in 1958. Economic factors that contributed to the decline in production at merchant plants in recent years have been discussed many times in preceding Coke and Coal Chemicals chapters.

Since World War II iron and steel companies have tried to build sufficient coal-carbonizing capacities to meet their blast-furnace fuel requirements. This expansion has affected merchant plants and probably will limit future output of these plants, as it reduces requirements for merchant blast-furnace coke. For example, as late as 1950–53, blast furnaces, in addition to the coke made in integrated coke ovens (furnace plants), annually consumed about 9 million tons of merchant oven and beehive coke. During that period merchant oven-coke plants annually supplied about 45 percent or 4 million tons. In subsequent years, the amount of merchant oven and beehive coke required by blast furnaces declined steadily and in 1959 totaled only 3.2 million tons. Approximately 75 percent, or 2.4 million tons, of the 3.2 million tons originated at merchant oven-coke plants.

TABLE 6.—Monthly and daily production of oven coke in the United States, 1947–49 (average) and 1958–59, by types of plant, in net tons

Month	1947–49 (average)		1958		1959	
	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants
Production:						
January	1,174,700	4,700,600	651,500	4,070,000	670,800	4,884,400
February	1,070,100	4,323,300	581,400	3,465,300	616,400	4,841,800
March	1,157,800	4,618,000	589,300	3,719,700	648,600	5,636,900
April	1,043,000	4,188,600	518,200	3,291,000	595,100	5,501,500
May	1,129,300	4,578,100	483,000	3,387,800	592,400	5,674,500
June	1,080,700	4,329,000	447,300	3,450,400	562,700	5,382,800
July	1,082,100	4,273,800	437,100	3,498,300	534,600	2,963,500
August	1,097,700	4,466,700	465,200	3,818,500	519,400	1,269,400
September	1,072,800	4,321,900	529,200	3,928,900	492,500	1,246,400
October	1,047,400	3,471,600	583,400	4,469,900	465,700	1,335,000
November	1,026,000	3,977,500	593,000	4,590,200	523,300	3,760,700
December	1,132,800	4,725,000	664,600	4,772,500	628,300	5,442,600
Total	13,114,400	51,974,100	6,543,200	46,462,500	6,849,800	47,939,500
Daily average:						
January	37,900	151,600	21,000	131,300	21,600	157,600
February	38,200	154,400	20,700	123,800	22,000	173,000
March	37,300	149,000	19,000	120,000	20,900	181,800
April	34,800	139,600	17,300	109,700	19,800	183,400
May	36,400	147,700	15,600	109,300	19,100	183,100
June	36,000	144,300	14,900	115,000	18,800	179,400
July	34,900	137,900	14,100	112,800	17,300	95,600
August	35,400	144,100	15,000	123,200	16,800	40,900
September	35,700	144,100	17,600	131,000	16,400	41,600
October	33,800	112,000	18,800	144,200	15,000	43,100
November	34,200	132,600	19,800	153,000	17,400	125,400
December	36,600	152,400	21,400	154,000	20,200	175,600
Average for year	35,900	142,400	17,900	127,300	18,800	131,300

Digitized by Google

TABLE 7.—Number and production of oven-coke plants in the United States, 1929, 1939, 1947–49 (average), and 1955–59, by types of plant

Year	Number of active plants [1]		Coke produced (net tons)		Percent of production	
	Merchant plants	Furnace plants	Merchant plants	Furnace plants	Merchant plants	Furnace plants
1929	41	46	12,187,439	41,224,387	22.8	77.2
1939	39	45	11,070,506	31,811,807	25.8	74.2
1947–49 (average)	[2] 31	[2] 55	13,114,373	51,974,089	20.1	79.9
1955	23	58	9,094,527	64,489,687	12.4	87.6
1956	23	57	9,575,194	62,417,048	13.3	86.7
1957	22	57	8,685,795	65,174,897	11.8	88.2
1958	22	55	6,543,218	46,462,512	12.3	87.7
1959	21	54	6,849,786	47,939,490	12.5	87.5

[1] Includes plants operating any part of year.
[2] Dec. 31, 1949.

PRODUCTION BY STATES

Production of oven and beehive coke, by States, is shown in table 8. The number of producing States seldom changes, and only one less State produced coke in 1959 than in the 1947–49 period. Since that time a number of developments affected coke production in various States. Expansion in blast-furnace capacity in several States increased coke requirements, and coke production increased accordingly. This accounted for the gain in production between 1949 and 1957 in Pennsylvania, Ohio, Indiana, Maryland, and Michigan. The general business recession and steel strike held down production in 1958 and 1959. The steady decline in the use of coke for manufacturing water gas and for residential heating was a contributing factor in the drop in production in Massachusetts, New Jersey, and New York. Beehive-coke production, although nearly double the 1958 total, was only about one-fifth the 1947–49 average. Pennsylvania continued to lead in beehive production and supplied more than two-thirds of the beehive output of the United States.

COKE BREEZE

Production of coke breeze increased slightly in 1959 despite a decrease in yield at both oven- and beehive-coke plants. Yield of breeze at oven-coke plants was 4.78 percent of the coal carbonized, and the yield for the beehive-coke plants equipped to screen their coke was 6.23 percent. All oven-coke plants are equipped to screen their coke and recover breeze. Few beehive plants have screening facilities, and most of the breeze is wasted. Breeze usually has a higher ash content and a lower calorific value than coke. This limits its uses, and long rail hauls can be justified only when it is used for special purposes and no substitute fuel is available.

For many years breeze was used mainly as a boiler fuel for generating power at or near the producing plants. As shown in table 10, nearly 3.5 million tons of breeze was used annually for steam raising during the 1947–49 period. This tonnage represented about 63 percent of the total output. In recent years, however, breeze has taken on a new importance because of its increased use in agglomerating

Digitized by Google

TABLE 8.—Coke produced in the United States, 1947–49 (average) and 1956–59, by States, in net tons

State	1947–49 (average)	1956	1957	1958	1959
Oven coke:					
Alabama	5,682,198	5,763,749	5,919,434	4,256,616	4,897,884
California, Colorado, and Utah	2,155,788	3,115,791	3,214,807	2,578,585	2,311,248
Illinois	3,558,768	2,802,223	2,918,015	1,910,835	2,044,977
Indiana	8,301,067	8,920,369	9,754,559	7,797,352	6,892,972
Kentucky, Tennessee, and Texas	1,374,287	1,926,753	2,040,468	1,816,137	1,746,449
Maryland	2,054,315	3,050,420	3,430,863	2,896,268	2,402,312
Massachusetts	1,048,037	608,052	554,398	353,752	338,387
Michigan	2,717,650	3,531,031	3,707,430	2,526,202	3,265,252
Minnesota	841,976	1,012,564	916,713	642,618	695,536
New Jersey	1,396,082	1,223,050	967,526	745,362	615,001
New York	5,507,449	3,825,368	3,995,320	2,976,610	3,046,813
Ohio	9,847,621	11,799,045	11,299,353	6,474,405	8,840,750
Pennsylvania	15,964,464	19,098,406	20,082,883	13,968,893	13,755,846
West Virginia	3,101,109	4,197,403	3,938,002	3,289,537	3,077,138
Connecticut, Missouri, and Wisconsin	[1] 1,537,651	1,118,018	1,120,921	772,558	858,711
Total	65,088,462	71,992,242	73,860,692	53,005,730	54,789,276
Beehive coke:					
Colorado	7,163				
Pennsylvania	4,848,550	2,033,852	1,617,466	355,458	713,150
Kentucky, Utah, Virginia, and West Virginia	704,227	456,432	472,563	242,914	[2] 361,146
Total	5,559,940	2,490,284	2,090,029	598,372	1,074,296
Grand total	70,648,402	74,482,526	75,950,721	53,604,102	55,863,572

[1] Includes Rhode Island.
[2] Excludes Utah.

iron ore and taconite and smelting phosphate rock. In 1959, the quantity of breeze used by coke producers for sintering iron ore was more than three times the 1947–49 average. This figure, however, was not all the breeze used in agglomerating plants, as it did not include breeze used for sintering, which was recovered from rescreening blast-furnace coke at the blast furnaces, or breeze used at agglomerating plants that are not affiliated with coke plants. Data on materials used in all agglomerating plants were collected by the Bureau of Mines in its annual iron-ore survey. This survey revealed that about 1.4 million tons of breeze was utilized for agglomerating and pelletizing iron ore and taconite. This figure was in close agreement with data published by the American Iron and Steel Institute.

The use of coke breeze in the manufacture of elemental phosphorus was estimated at more than one-half million tons in 1959.

Prices of coke breeze increased 2 percent and averaged $7.49 per ton. This price was about twice the 1947–49 average and was indicative of the increased demand.

NUMBER AND TYPE OF OVENS

Slot-Type Coke Ovens.—There was little activity in coke-oven construction in 1959, and only 90 new ovens were completed. In addition, 11 old ovens that had been out of production for several years were repaired and placed in operation. Thus, 101 ovens were added to the ovens in existence. However, 352 ovens were taken out of production. These consisted of the following: 10 ovens were blanked off in operating batteries; 25 were dismantled for rebuilding; and

Digitized by Google

TABLE 9.—Coke breeze recovered at coke plants in the United States in 1959, by States

State	Yield per ton of coal [1] (percent)	Produced		Used by producers—						Sold		On hand Dec. 31 (net tons)
				In steam plants		In agglomerating plants		For other industrial uses				
		Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value	
Oven coke:												
Alabama	4.76	320,139	$3,229,858	74,809	$713,878	32,987	$364,404	37,191	$404,144	144,097	$1,422,829	42,468
California, Colorado, and Utah	6.42	239,561	1,772,084			165,666	1,052,515	22,047	141,858	49,930	582,077	22,720
Illinois	4.94	147,413	852,782	49,815	218,348	52,438	273,774	16,043	109,991	49,093	345,565	11,022
Indiana	5.13	491,365	4,198,997	70,628	560,742	271,609	2,662,053	47,672	392,412	94,005	622,223	920,264
Kentucky, Tennessee, and Texas	5.33	130,787	939,753	1,937	9,183	50,383	194,987	6,699	26,597	84,011	813,915	3,874
Maryland	4.73	150,078	(2)	116,701	(2)			19,327	(2)			44,557
Massachusetts	8.73	43,066	(2)	43,034	(2)					32	(2)	
Michigan	5.06	223,846	1,807,184	(3)	(3)	(3)	(3)	33,364	278,279	46,889	(2)	35,510
Minnesota	5.32	53,148	269,780	19,400	62,500			9,817	58,285	4,402	31,704	28,048
New Jersey	6.73	56,873	(2)	(2)	(2)					(2)	(2)	17,222
New York	5.15	225,377	1,336,983	157,545	947,101	(3)	(3)	21,203	(2)	(3)	(3)	83,839
Ohio	4.32	537,604	3,729,638	75,589	522,613	101,145	593,989	73,515	417,698	254,201	1,980,886	142,074
Pennsylvania	3.97	790,249	3,956,661	459,201	2,196,969	54,887	537,181	140,340	463,737	103,736	562,114	290,487
West Virginia	4.89	216,485	1,243,070	22,714	111,877	135,619	773,558	30,785	176,727	25,295	171,093	9,201
Connecticut, Missouri, and Wisconsin	7.30	84,917	721,578	41,214	413,963					41,358	337,070	8,888
Undistributed			1,491,290	76,825	1,423,702	118,065	972,350		236,168	2,907	342,306	
Total 1959	4.78	3,710,968	25,549,658	1,209,412	7,180,876	982,799	7,424,811	458,003	2,705,896	899,956	7,211,782	[3] 1,660,174
At merchant plants	5.97	569,627	4,624,957	254,518	1,785,735			23,892	235,407	271,765	2,593,314	87,326
At furnace plants	4.61	3,141,341	20,924,701	954,894	5,395,141	982,799	7,424,811	434,111	2,470,489	628,191	4,618,468	1,572,848
Total 1958	4.84	3,656,198	24,570,733	1,514,757	8,542,201	768,415	4,927,140	354,997	2,262,884	865,988	6,610,440	[3] 1,498,891
Beehive coke:												
Pennsylvania	6.57	47,559	90,659							59,342	109,983	
Kentucky, Virginia, and West Virginia	5.70	26,658	64,870							26,166	63,491	722
Total 1959	6.23	74,217	155,529							85,508	173,474	722
Total 1958	8.08	58,508	120,484							48,275	107,648	12,013

[1] Computed by dividing production of breeze by coal carbonized at plants actually recovering breeze.
[2] Included with "Undistributed" to avoid disclosing individual company figures.
[3] Includes some breeze resulting from the screening of coke at blast furnaces.

Digitized by Google

TABLE 10.—Oven- and beehive-coke breeze used or sold in the United States, by uses, 1947–49 (average) and 1955–59, in net tons

Year	Used by producers				Sold	Average value per ton
	In steam plants	In agglomerating plants	For making producer or water gas	For other industrial uses		
1947-49 (average)	3,450,905	[1] 300,000	77,795	411,260	1,142,589	$3.79
1955	2,581,803	453,055		579,408	1,259,555	5.53
1956	2,423,147	591,686		443,549	1,196,939	6.19
1957	2,113,472	637,956		528,514	1,227,197	6.90
1958	1,514,757	768,415		354,997	914,263	7.35
1959	1,209,412	982,799		458,003	985,464	7.49

[1] Estimated.

317 were permanently abandoned. The ovens permanently abandoned comprised 111 ovens of the Public Service Electric and Gas Co. at Camden, N.J., which closed down permanently in June; 100 ovens at the Cleveland works of the Jones and Laughlin Steel Corp., which were demolished; 35 ovens of the Pittsburgh Coke and Chemical Co. at Neville Island, Pa.; and 71 ovens of the Belle, W. Va., plant of E. I. du Pont de Nemours and Co. The net loss, 251 ovens, reduced the ovens in existence at yearend to 15,993. (See table 11.)

Table 12 shows the age of slot-type coke ovens at merchant and furnace coke plants at the end of 1959. The extensive construction and modernization of coke ovens conducted by the iron and steel industry since the early 1940's was responsible for the large proportion of ovens that were less than 20 years old at furnace coke plants. However, most merchant plants were unable to replace their old ovens because of economic factors, and only 31 percent of the ovens at merchant plants were less than 20 years old.

Although great care is essential for the efficient operation of slot-type coke ovens, they are rugged and can be operated for many years. This is shown by the fact that 42 percent of the ovens at merchant plants and 15 percent at furnace plants were more than 40 years old.

Beehive Ovens.—The number of beehive-coke ovens in existence on December 31, 1959, totaled 7,448, a decline of 1,234. The number of beehive ovens reported to the Bureau of Mines in recent years has fluctuated with the demand of blast-furnace coke and the availability of oven coke. Increased carbonizing capacity at iron and steel plants and the slackening in blast-furnace operations in the past several years have greatly reduced the need for beehive coke. Consequently, many of the beehive-coke plants that had operable ovens in 1959 were idle. As shown in table 15, the highest average number of ovens active in any month was 3,451 in April. The number of active ovens declined to about 1,500 during the steel strike. The number of ovens in operation increased after the steel strike ended and in December averaged 2,268. This average was considerably less than the April average and represented only about one-third of the ovens in existence.

Digitized by Google

TABLE 11.—Slot-type coke ovens completed and abandoned in the United States in 1959 and number in existence on December 31, by States

State	Plants in existence Dec. 31 [1]	Ovens						
		In existence Dec. 31		New		Abandoned during year [2]	Under construction Dec. 31	
		Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)		Number	Annual coke capacity (net tons)
Alabama	7	1,488	7,249,900					
California	1	315	1,450,000	90	380,500			
Colorado	1	237	985,500			9		
Connecticut	1	70	410,000					
Illinois	6	507	2,714,000					
Indiana	5	2,191	10,765,200					
Kentucky	1	196	1,185,200					
Maryland	1	758	4,174,000					
Massachusetts	1	108	665,000					
Michigan	4	769	4,416,500					
Minnesota	3	241	1,083,600					
Missouri	1	96	327,600	[3] 11	25,900			
New Jersey	1	230	1,100,000			111		
New York	3	830	4,529,100			1		
Ohio	14	2,390	12,648,900			125		
Pennsylvania	14	4,133	20,450,300			35	118	720,000
Tennessee	1	44	264,000					
Texas	2	140	832,000					
Utah	2	308	1,345,700					
West Virginia	4	742	4,281,100			71		
Wisconsin	1	200	570,100					
Total 1959	74	15,993	81,447,700	101	406,400	352	118	720,000
At merchant plants	20	2,249	10,393,800	11	25,900	182		
At furnace plants	54	13,744	71,053,900	90	380,500	170	118	720,000
Total 1958	77	16,244	82,497,900	808	4,349,400	461	149	793,600

[1] Excludes plants retired permanently during year.
[2] Includes ovens dismantled for rebuilding.
[3] Idle ovens repaired and placed in operation.

TABLE 12.—Age of slot-type coke ovens in the United States on Dec. 31, 1959 [1]

Age	At merchant plants		At furnace plants		Total			
	Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)	Number	Percent of total	Annual coke capacity (net tons)	Percent of total
Under 5 years			1,819	9,610,900	1,819	11.4	9,610,900	11.8
From 5 to 10 years	214	1,050,800	3,725	20,056,800	3,939	24.6	21,107,600	25.9
From 10 to 15 years	163	852,400	2,114	11,571,100	2,277	14.2	12,423,500	15.3
From 15 to 20 years	315	1,855,500	2,393	12,770,400	2,708	16.9	14,625,900	18.0
From 20 to 25 years	35	155,200	1,044	5,992,200	1,079	6.8	6,147,400	7.5
From 25 to 30 years								
From 30 to 35 years	447	2,316,100	379	1,934,000	826	5.2	4,250,100	5.2
From 35 to 40 years	125	418,100	218	980,000	343	2.1	1,398,100	1.7
40 years and over	950	3,745,700	2,052	8,138,500	3,002	18.8	11,884,200	14.6
Total	2,249	10,393,800	13,744	71,053,900	15,993	100.0	81,447,700	100.0

[1] Age dates from first entry into operation or from last date of rebuilding.

Digitized by Google

TABLE 13.—Number of slot-type coke ovens in the United States on December 31, 1959, by States and kinds

State	Koppers	Koppers-Becker	Semet-Solvay	Wilputte	All others	Total
Alabama	338	842	180	65	[1] 63	1,488
California		315				315
Colorado	100	137				237
Connecticut		70				70
Illinois		177		330		507
Indiana	340	1,079	120	652		2,191
Kentucky			120	76		196
Maryland		758				758
Massachusetts		108				108
Michigan		259	362	148		769
Minnesota	65	156		20		241
Missouri	56				[2] 40	96
New Jersey	165	65				230
New York	186	236	180	228		830
Ohio	694	762	176	758		2,390
Pennsylvania	1,191	1,965	88	889		4,133
Tennessee			24	20		44
Texas		140				140
Utah		308				308
West Virginia	154	514		74		742
Wisconsin	100		100			200
Total 1959	3,389	7,891	1,350	3,260	103	15,993
At merchant plants	521	627	684	377	40	2,249
At furnace plants	2,868	7,264	666	2,883	63	13,744
Total 1958	3,378	7,982	1,450	3,331	103	16,244

[1] Otto.
[2] Simon-Carves.

TABLE 14.—Beehive-coke ovens reconstructed and abandoned in the United States in 1959 and number in existence on December 31, by States

State	Plants in existence Dec. 31	Ovens								
		In existence Dec. 31		In operating condition Dec. 31		Not in operating condition Dec. 31		Rebuilt or repaired	Abandoned or dismantled during year	In course of reconstruction Dec. 31
		Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)	Number	Annual coke capacity (net tons)			
Kentucky	1	193	120,000	193	120,000					
Pennsylvania	35	6,080	3,632,800	4,125	2,568,200	1,955	1,064,600	189	1,425	150
Virginia	5	663	359,000	626	341,700	37	17,300			3
West Virginia	4	512	257,000	204	101,700	308	155,300	2		
Total 1959	45	7,448	4,368,800	5,148	3,131,600	2,300	1,237,200	191	[1] 1,425	153
Total 1958	53	8,682	5,020,400	5,521	3,320,500	3,161	1,699,900	182	[1] 1,019	9

[1] Idle and not expected to resume production; removed from list of available ovens.

TABLE 15.—Average number of beehive-coke ovens active in the United States in 1959, by months

Month	Number	Month	Number	Month	Number
January	2,051	May	3,308	September	1,491
February	2,474	June	2,605	October	1,315
March	3,116	July	2,546	November	1,798
April	3,451	August	1,531	December	2,268

569112—60——14

Digitized by Google

CAPACITY OF OVEN-COKE PLANTS

The potential maximum annual coke capacity of oven-coke plants decreased 1 million tons from the record capacity of 1958. The 1-million-ton decrease consisted of 637,000 tons at merchant plants and 413,200 tons at furnace plants. The decrease for merchant plants was due principally to the permanent closing of the Belle, W. Va., plant by E. I. du Pont de Nemours and Co. and of the Camden, N.J., plant by Public Service Electric and Gas Co. The loss in capacity at furnace plants was caused mainly by the retirement of the coke plant at the Cleveland, Ohio, steel plant of Jones and Laughlin Steel Corp. The potential annual coke capacity reported to the Bureau of Mines by coke producers is based on the minimum coking time necessary to produce coke with qualities suitable for its intended use. Therefore, the potential capacity of a plant may change from year to year, depending on the age and condition of the ovens, the character and quality of coal carbonized, the grade of coke required, and other economic factors. Thus, the capacity reported to the Bureau of Mines may differ from the designed or rated capacity estimated by the coke-oven builder at the time of construction. For example, if the generally accepted standard coking rate of 1 inch per hour was used to calculate the capacity of slot-type ovens on December 31, 1959, the capacity would have been 84 million tons—3 percent higher than the potential capacity reported to the Bureau of Mines. However, because of the factors previously mentioned, the maximum annual coke capacity shown in table 16 is a reliable measure of the practical operating capacity for the years given.

The monthly operating rates for oven-coke plants, 1955–59, are shown in table 17. Although the average rate for 1959 was 3 percentage points above 1958, it was far below the normal operating rate. In the first 6 months of 1959, oven-coke plants produced at an average rate of 88 percent of capacity, but the rate dropped sharply in July because of the steel strike and remained at the lowest level in 10 years in August–October. Termination of the steel strike in November started production upward, and ovens reached

TABLE 16.—Potential maximum annual coke capacity of all oven-coke plants in existence in the United States, 1949 and 1955–59

Year	At merchant plants				At furnace plants				Total			
	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)	In existence Dec. 31		Potential maximum annual coke capacity (net tons)	Change from 1949 (percent)
	Plants	Ovens			Plants	Ovens			Plants	Ovens		
1949	30	3,057	14,209,200	------	55	12,047	59,500,900	------	85	15,104	73,710,100	------
1955	23	2,482	11,220,200	−21.0	58	13,557	68,455,300	+15.0	81	16,039	79,675,500	+8.1
1956	22	2,424	11,009,600	−22.5	57	13,499	68,955,500	+15.9	79	15,923	79,965,100	+8.5
1957	22	2,420	11,061,400	−22.2	56	13,477	69,238,000	+16.4	78	15,897	80,299,400	+8.9
1958	22	2,420	11,030,800	−22.4	55	13,824	71,467,100	+20.1	77	16,244	82,497,900	+11.9
1959	21	2,249	10,393,800	−26.9	54	13,744	71,053,900	+19.4	75	15,993	81,447,700	+10.5

Digitized by Google

TABLE 17.—Relationship of production to potential maximum capacity[1] at oven-coke plants in the United States, 1955–59, by months, in percentages

Month	1955	1956	1957	1958	1959	Month	1955	1956	1957	1958	1959
January	85.6	97.5	95.3	68.5	80.6	August	93.3	81.2	92.6	61.6	25.7
February	87.9	97.5	95.3	65.0	87.7	September	96.5	96.2	92.5	66.3	25.8
March	91.4	97.0	95.7	62.5	91.2	October	96.7	96.9	89.5	72.7	25.8
April	92.6	96.5	92.7	57.1	91.4	November	98.4	96.6	83.1	77.1	63.3
May	93.7	94.7	93.1	56.1	91.0	December	99.5	97.8	74.0	78.3	86.8
June	92.9	91.9	92.5	57.9	87.8						
July	90.5	33.3	92.5	56.6	50.0	Average	93.3	89.7	92.0	64.3	67.3

[1] Capacity of all ovens in existence, whether active or idle, based upon maximum daily capacity multiplied by days in month.

their normal operating rate by yearend. The rate of coke production in December did not match the average for the first 6 months; however, it averaged 86.8 percent of capacity.

QUANTITY AND VALUE OF COAL CARBONIZED

Coal carbonized in the United States was less than 100 million tons for the second consecutive year. Beginning with 1950, the coke industry has carbonized more than 100 million tons in each of 6 years and failed to achieve this figure only in 1952, 1954, 1958, and 1959. Steel strikes that caused furnace oven-coke plants to bank or reduce their operating rates were responsible for the low tonnages in 1952, 1954, and 1959, whereas the business recession caused the low figure in 1958. Although the coke industry carbonized only 79.6 million tons of coal in 1959, it was the second largest coal consumer, utilizing nearly one-fifth of the bituminous-coal output. Normally, daily and monthly consumption rates of coal at coke plants are uniform and do not follow seasonal patterns. This stability in coal consumption is due to the fact that virtually all of the coke and gas, the principal products of the carbonization process, is used for industrial purposes throughout the year. Consumption of bituminous coal in the first 6 months of 1959 was 51.5 million tons but dropped to 27.7 million in the last half of the year because of the steel strike from July 15 to November 7. Although the strike ended on November 7, it was

TABLE 18.—Bituminous coal carbonized in coke ovens in the United States, 1947–49 (average) and 1958–59, by months, in net tons

Month	1947–49 (average)			1958			1959		
	Slot type	Beehive	Total	Slot type	Beehive	Total	Slot type	Beehive	Total
Jan.	8,320,100	987,400	9,307,500	6,601,100	85,600	6,776,700	7,865,600	138,700	8,004,300
Feb.	7,647,600	906,500	8,554,100	5,753,200	65,800	5,819,000	7,719,900	154,200	7,874,100
Mar.	8,195,000	726,000	8,921,000	6,126,000	71,200	6,197,200	8,859,900	235,100	9,095,000
Apr.	7,448,200	700,900	8,149,100	5,442,700	60,100	5,502,800	8,611,300	267,000	8,878,300
May	8,096,100	905,800	9,001,900	5,552,700	66,100	5,618,800	8,829,700	222,700	9,052,400
June	7,697,200	673,900	8,371,100	5,572,800	79,000	5,651,800	8,360,700	201,600	8,562,300
July	7,631,400	482,200	8,113,600	5,635,300	53,500	5,688,800	4,931,500	119,600	5,051,100
Aug.	7,901,400	665,500	8,566,900	6,111,900	68,600	6,180,500	2,530,100	88,000	2,618,100
Sept.	7,617,700	645,000	8,262,700	6,344,200	94,600	6,438,800	2,458,200	67,100	2,525,300
Oct.	6,397,800	669,100	7,066,900	7,200,500	108,900	7,309,400	2,534,900	67,200	2,602,100
Nov.	7,118,300	641,900	7,760,200	7,386,200	122,800	7,509,000	6,099,600	111,800	6,211,400
Dec.	8,326,100	712,700	9,038,800	7,744,500	139,200	7,883,700	8,552,700	154,500	8,707,200
Total	92,396,900	8,716,900	101,113,800	75,561,100	1,015,400	76,576,500	77,354,100	1,827,500	79,181,600

Digitized by Google

another 2 or 3 weeks before the coke plants could reach normal operating rates. Consequently, the total quantity of coal carbonized was only 4 percent above the 1958 total but was 22 percent below the 1947–49 average and 30 percent under the record established in 1951.

The average values per ton for coal delivered to oven- and beehive-coke plants were $9.88 and $6.10, respectively. The average value of coal delivered to oven-coke plants decreased $0.01 per ton, whereas that of coal delivered to beehive plants increased $0.39 per ton. Since 1957, coal costs at oven-coke plants have declined slightly, as shown in table 20. The stability of coking-coal costs during this period of increasing labor and transportation costs was a remarkable accomplishment of the bituminous-coal industry and was achieved by increasing productivity through mechanization of mines. Table 21 gives detailed data on the average value per ton of coal delivered to oven-coke plants, by States, for 1959 and several preceding years.

TABLE 19.—Anthracite carbonized at oven-coke plants in the United States, 1947–49 (average) and 1956–59, by months, in net tons

Month	1947–49 (average)	1956	1957	1958	1959
January	17,600	33,400	31,800	29,000	28,400
February	16,600	32,300	30,700	25,700	28,100
March	19,300	36,500	33,100	24,700	31,800
April	21,500	33,100	37,600	20,700	29,000
May	18,800	33,600	38,500	18,900	33,400
June	19,800	29,700	32,100	15,000	30,800
July	18,200	24,900	30,000	15,100	29,400
August	18,900	31,700	30,000	17,300	29,500
September	20,100	30,400	31,400	19,200	28,200
October	22,000	30,700	33,600	22,000	33,700
November	20,900	30,400	31,700	21,900	33,600
December	16,700	30,600	28,800	25,300	32,900
Total	230,400	377,300	389,300	254,800	368,800

TABLE 20.—Value of coal and products per net ton of coal carbonized in the United States, 1947–49 (average) and 1955–59

Year	Oven coke					Beehive coke	
	Value of coal per ton	Value per ton of coal				Value of coal per ton	Value per ton of coal
		Coke produced	Breeze produced	Coal chemical materials used or sold [1]	Total		
1947–49 (average)	$7.79	$8.49	$0.19	$2.85	$11.53	$4.90	$7.22
1955	8.84	11.44	.24	3.70	15.38	5.59	7.75
1956	9.35	12.46	.26	3.75	16.47	5.99	8.62
1957	9.91	12.88	.28	3.86	17.02	6.25	8.98
1958	9.89	12.75	.32	3.96	17.03	5.71	8.27
1959	9.88	12.56	.33	3.71	16.60	6.10	8.61

[1] Includes value of surplus gas used and tar and pitch-of-tar burned.

Digitized by Google

TABLE 21.—Average value per net ton of coal carbonized at oven-coke plants in the United States, 1947–49 (average) and 1956–59, by States

State	1947–49 (average)	1956	1957	1958	1959
Alabama	$6.27	$7.68	$7.72	$8.21	$8.56
California, Colorado, and Utah	7.44	11.43	12.06	11.72	13.04
Connecticut, Maryland, Massachusetts, New Jersey, and New York	[1] 9.13	11.00	11.81	12.07	11.72
Illinois	9.00	10.44	10.89	10.39	10.58
Indiana	8.99	10.58	11.12	11.31	11.29
Kentucky, Missouri, Tennessee, and Texas	8.00	9.55	10.65	10.78	10.37
Michigan	7.98	9.76	10.28	10.17	10.18
Minnesota and Wisconsin	9.18	10.12	11.40	11.45	11.54
Ohio	7.75	9.35	9.95	9.80	9.56
Pennsylvania	6.88	8.36	8.77	8.33	8.48
West Virginia	5.79	6.97	7.57	7.79	7.90
U.S. average	7.79	9.35	9.91	9.89	9.88
Value of coal per ton of coke	11.09	13.28	14.08	14.15	14.02

[1] Includes Rhode Island.

TABLE 22.—Quantity and value at ovens of coal carbonized in the United States in 1959, by States

State	Coal carbonized			Coal per ton of coke	
	Net tons	Value		Net tons	Value
		Total	Average		
Oven coke:					
Alabama	6,728,381	$57,622,901	$8.56	1.37	$11.76
California, Colorado, and Utah	3,728,579	48,618,563	13.04	1.61	21.04
Illinois	2,984,483	31,570,171	10.58	1.46	15.44
Indiana	9,575,999	108,113,007	11.29	1.39	15.68
Kentucky, Tennessee, and Texas	2,453,771	25,530,284	10.40	1.41	14.62
Maryland	3,172,447	(1)	(1)	1.32	(1)
Massachusetts	493,313	(1)	(1)	1.46	(1)
Michigan	4,426,269	45,051,701	10.18	1.36	13.80
Minnesota	998,756	11,929,472	11.94	1.44	17.15
New Jersey	845,365	(1)	(1)	1.37	(1)
New York	4,373,476	48,585,534	11.11	1.44	15.95
Ohio	12,445,985	119,033,359	9.56	1.41	13.46
Pennsylvania	19,890,636	168,671,677	8.48	1.45	12.26
West Virginia	4,451,915	35,163,210	7.90	1.45	11.43
Connecticut, Missouri, and Wisconsin	1,163,532	12,637,879	10.86	1.35	14.72
Undistributed	----------	55,547,896	12.31	----------	16.55
Total 1959	77,722,907	768,075,654	9.88	1.42	14.02
At merchant plants	9,568,131	100,391,617	10.49	1.40	14.66
At furnace plants	68,154,776	667,684,037	9.80	1.42	13.93
Total 1958	75,815,826	749,896,571	9.89	1.43	14.15
Beehive coke:					
Pennsylvania	1,140,511	7,234,283	6.34	1.60	10.14
Kentucky, Virginia, and West Virginia	686,963	3,917,857	5.70	1.90	10.85
Total 1959	1,827,474	11,152,140	6.10	1.70	10.38
Total 1958	1,015,416	5,799,905	5.71	1.70	9.69

[1] Included with "Undistributed" to avoid disclosing individual company figures.

Digitized by Google

PREPARATION AND SOURCE OF COAL

Washed and Unwashed Coal.—One of the most important steps in preparing some coals for carbonization is cleaning the coal before charging it into the ovens. Coal may be cleaned by either wet and/or dry methods. Most of the cleaning is done by wet methods, as data reported to the Bureau of Mines by bituminous-coal producers for 1959 showed that about 93 percent of the cleaned coal was washed. Most of the cleaning processes are based upon the difference in specific gravity of the material to be treated. The cleaning is usually done at or near the mines, although in 1959 three coke plants had washeries adjacent to the ovens in which they washed some or all of their coal. In addition, two coke plants obtained their washed coal from central cleaning plants about midway between the mines and coke ovens. In 1959, 83 percent of the bituminous coal charged into coke ovens was mechanically cleaned before it was carbonized. This percentage was higher than that for the bituminous and lignite industry which cleaned only about two-thirds of the output.

The coke industry uses a high proportion of washed coal because coke quality depends much more upon the character and quality of the coal than upon oven design and carbonizing techniques. The proportion of washed coal carbonized has increased steadily in the past decade, rising from 31 percent in 1947–49 to the record established in 1959. This upward trend in coal cleaning may be attributed to the depletion of the high-quality premium coals and coal-mine mechanization. Table 23 shows the use of washed coal by States in 1959. Statistics in table 24 indicate the steady increase in use of cleaned coals at coke plants in recent years.

TABLE 23.—Washed and unwashed coal carbonized in the United States in 1959, by States in which used, in net tons

State	Bituminous coal			Anthracite	Total
	Washed	Unwashed	Total		
Oven coke:					
Alabama	6,600,086	102,680	6,702,766	25,615	6,728,381
California, Colorado, and Utah	3,044,473	684,106	3,728,579		3,728,579
Illinois	2,461,665	513,504	2,975,169	9,314	2,984,483
Indiana	9,243,229	287,502	9,530,731	45,268	9,575,999
Kentucky, Tennessee, and Texas	1,978,333	468,653	2,446,986	6,785	2,453,771
Maryland		3,172,447	3,172,447		3,172,447
Massachusetts	484,462		484,462	8,851	493,313
Michigan	4,354,919		4,354,919	71,350	4,426,269
Minnesota	824,696	154,858	979,554	19,202	998,756
New Jersey	707,764	121,933	829,697	15,668	845,365
New York	3,944,391	420,958	4,365,349	8,127	4,373,476
Ohio	10,718,114	1,683,725	12,401,839	44,146	12,445,985
Pennsylvania	14,779,440	5,059,292	19,838,732	41,904	19,880,636
West Virginia	4,451,915		4,451,915		4,451,915
Connecticut, Missouri, and Wisconsin	1,090,932		1,090,932	72,600	1,163,532
Total 1959	64,684,419	12,669,658	77,354,077	368,830	77,722,907
At merchant plants	8,840,843	411,349	9,252,192	315,939	9,568,131
At furnace plants	55,843,576	12,258,309	68,101,885	52,891	68,154,776
Total 1958	57,608,824	17,952,217	75,561,041	254,785	75,815,826
Beehive coke:					
Pennsylvania	907,016	233,495	1,140,511		1,140,511
Kentucky, Virginia, and West Virginia	475,898	211,065	686,963		686,963
Total 1959	1,382,914	444,560	1,827,474		1,827,474
Total 1958	709,687	305,729	1,015,416		1,015,416

Digitized by Google

TABLE 24.—Washed and unwashed bituminous coal carbonized in the United States, 1947–49 (average) and 1955–59, in net tons

Year	Washed coal			Unwashed coal			Total coal carbonized	Percent of total washed
	At coke ovens	At beehive ovens	Total	At coke ovens	At beehive ovens	Total		
1947–49 (average)	29,501,961	1,442,138	30,944,099	62,894,990	7,274,728	70,169,718	101,113,817	30.6
1955	73,735,758	1,670,764	75,406,522	30,771,947	1,198,448	31,970,395	107,376,917	70.2
1956	72,090,891	2,462,335	74,553,226	29,780,531	1,626,880	31,407,411	105,960,637	70.4
1957	76,364,204	2,196,977	78,561,181	28,182,427	1,276,161	29,458,588	108,019,769	72.7
1958	57,608,824	709,687	58,318,511	17,952,217	305,729	18,257,946	76,576,457	76.2
1959	64,684,419	1,382,914	66,067,333	12,669,658	444,560	13,114,218	79,181,551	83.4

Blending.—Coal blending is universally practiced because it not only provides the coke-oven operators with a wider selection of coals but also enables them to maintain a relatively constant quality. It has long been recognized that the coking characteristics of coal may be modified by careful blending. Some coals expand when carbonized but, otherwise, may be favorable for producing a high-quality coke. Such coals when used alone would make it difficult to discharge the coke and might damage the walls of the ovens. This expansion characteristic may be neutralized by mixing these coals with non-expanding coals. Blending also permits the use of a coal that has good coking properties but may have an objectionably high ash, sulfur, or phosphorus content, therefore could not be used alone as a 100-percent charge.

All coke plants mix or blend their coking coals. In 1959, 69 plants mixed coals of different volatile content. Of these, 36 used high- and low-volatile coals (including 6 utilizing anthracite); 28, high-, medium-, and low-volatile coals (including 13 using anthracite); 4, high- and medium-volatile coal; and 1, low- and medium-volatile coal and anthracite. Of the plants that blended only one type of coal, one used straight high-volatile and five straight medium-volatile coal.

The coking-coal admixtures used by the individual coke plants are established after comprehensive testing and experimenting. Once established, however, the admixtures are seldom changed. This is clearly demonstrated by the data shown in table 26.

Sources.—Ninety-three-percent of the coking coal shipped to oven-coke plants originated in States comprising the Appalachian region. The coking coals are classified as high-, medium-, and low-volatile coals. All three types of coking coal are found in this region. West Virginia was the leading supplier of coking coal, furnishing 32 percent of all high-volatile coal obtained by oven-coke plant operators, 27 percent of the medium-volatile coal, and 78 percent of the low-volatile coal. The low-volatile coals are important to the coke industry because when blended with high-volatile coals they improve the physical properties of metallurgical coke, particularly its strength. Other States in the Appalachian region that mined low-volatile coal were Pennsylvania and Virginia; together they supplied 20 percent of all low-volatile coals shipped to oven-coke plants.

Digitized by Google

TABLE 25.—Coal obtained by coke-oven operators in the United States in 1959, by consuming States and volatile content,[1] in net tons

Consuming State	High-volatile		Medium-volatile		Low-volatile		Total coal obtained
	Net tons	Percent of total	Net tons	Percent of total	Net tons	Percent of total	
Alabama	422,952	6.7	5,629,220	88.5	307,930	4.8	6,360,102
California, Colorado, and Utah	3,337,401	83.9	303,367	7.6	337,490	8.5	3,978,258
Illinois	2,240,666	74.2	39,758	1.3	740,437	24.5	3,020,861
Indiana	5,447,644	56.6	1,468,350	15.2	2,711,250	28.2	9,627,244
Kentucky, Tennessee, and Texas	1,715,919	69.9	228,120	9.3	509,355	20.8	2,453,394
Maryland	2,129,880	70.0	-------	------	911,635	30.0	3,041,515
Massachusetts	235,486	48.6	156,793	32.4	92,183	19.0	484,462
Michigan	3,026,998	64.9	351,315	7.5	1,286,628	27.6	4,664,941
Minnesota	557,968	56.9	131,902	13.4	291,570	29.7	981,440
New Jersey	359,746	42.9	282,509	33.7	196,298	23.4	838,553
New York	2,715,999	64.1	480,428	11.4	1,038,980	24.5	4,235,407
Ohio	8,912,659	71.7	566,625	4.5	2,957,088	23.8	12,436,372
Pennsylvania	14,902,145	75.7	1,734,482	8.8	3,052,660	15.5	19,689,227
West Virginia	3,524,623	80.5	91,246	2.1	759,806	17.4	4,375,675
Connecticut, Missouri, and Wisconsin	389,430	31.8	328,228	26.8	506,817	41.4	1,224,475
Total 1959	49,919,516	64.5	11,792,343	15.2	15,700,067	20.3	77,411,926
At merchant plants	4,662,897	47.9	1,903,200	19.6	3,166,490	32.5	9,732,587
At furnace plants	45,256,619	66.9	9,889,143	14.6	12,533,577	18.5	67,679,339
Total 1958	50,653,053	66.8	9,665,379	12.7	15,540,554	20.5	75,858,986

[1] High-volatile—dry volatile matter, over 31 percent; medium-volatile—dry volatile matter, 22 to 31 percent; low-volatile—dry volatile matter, 14 to 22 percent.

Coking-coal deposits west of the Mississippi River are much smaller and more widely scattered than the reserves of the Appalachian region. Coking coal was obtained from the Trinidad field of southern Colorado and northern New Mexico, the Sunnyside beds in the Castle Gate field of Utah, Haskell and other counties in eastern Oklahoma, and Sebastian County in western Arkansas. The Oklahoma-Arkansas deposits are the only commercially developed sources of low-volatile coal in the West. A small quantity of coal was imported from Canada and carbonized in Utah. Table 27 shows the States of origin of coking coal obtained by coke-plant operators in 1959.

The origin and distribution of coking coal to oven-coke plants in 1959 are summarized in table 28.

TABLE 26.—Average volatile content of high-, medium-, and low-volatile bituminous coal carbonized in the United States, 1947–49 (average) and 1955–59

Year	High		Medium		Low		Total	
	Net tons	Volatile content (percent)	Net tons	Volatile content (percent)	Net tons	Volatile content (percent)	Net tons	Volatile content (percent)
1947–49 (average)	60,454,142	34.0	11,484,978	27.9	20,457,830	17.2	92,396,950	29.5
1955	70,441,632	34.5	11,358,431	26.8	22,707,642	17.5	104,507,705	29.9
1956	67,361,091	34.9	11,221,853	26.8	23,288,478	17.5	101,871,422	30.0
1957	68,788,430	34.6	12,052,871	26.3	23,705,330	17.5	104,546,631	29.7
1958	51,012,307	34.8	10,271,173	25.7	14,277,561	17.5	75,561,041	30.3
1959	49,698,552	35.3	12,017,265	25.9	15,638,260	17.3	77,354,077	30.2

Digitized by Google

TABLE 27.—Origin of coal obtained by coke-oven operators in the United States in 1959, by producing fields and volatile content, in net tons

State and field [1] where coal was produced	Volatile content [2]			Total
	High	Medium	Low	
Alabama	511,819	5,400,215		5,912,034
Arkansas			224,277	224,277
Colorado	1,107,625	159,297		1,266,922
Illinois	657,493			657,493
Kentucky:				
Elkhorn	5,121,654			5,121,654
Harlan	3,698,546			3,698,546
Kenova-Thacker	22,358			22,358
New Mexico	53,936			53,936
Oklahoma	537,381	260,007	213,552	1,010,940
Pennsylvania:				
Anthracite			369,402	369,402
Bituminous:				
Central Pennsylvania		318,955	2,304,588	2,623,543
Connellsville	6,001,457			6,001,457
Freeport	2,386,831			2,386,831
Pittsburgh	9,481,349			9,481,349
Somerset			178,174	178,174
Westmoreland	183,432			183,432
Tennessee		258,786		258,786
Utah	2,161,394			2,161,394
Virginia:				
Buchanan	273,811	747,701		1,021,512
Clinch Valley		116,106		116,106
Pocahontas		948,633	241,285	1,189,918
Southwestern	1,589,816	412,911		2,002,727
West Virginia:				
Coal River	202,664			202,664
Coal and Coke	71,310			71,310
Fairmont	5,308,851			5,308,851
Kanawha	6,147,708	337,991		6,485,699
Kenova-Thacker	742,630			742,630
Logan	2,707,183	167,182		2,874,365
New River	240,684	64,502	249,910	555,096
Pocahontas		582,644	9,080,337	9,662,981
Randolph-Barbour	203,268	109,466		312,734
Tug River			53,877	53,877
Webster-Gauley	506,316	1,000,911		1,507,227
Winding Gulf		877,665	2,784,665	3,662,330
Canada		29,371		29,371
Total	49,919,516	11,792,343	15,700,067	77,411,926

[1] As defined by the U.S. Coal Commission of 1922.
[2] High-volatile—dry volatile matter, over 31 percent; medium-volatile—dry volatile matter, 22 to 31 percent; low-volatile—dry volatile matter, 14 to 22 percent.

Captive Coal.—The coke-producing companies in the United States obtain most of their coking-coal requirements from coal mines owned and operated by their parent companies. The coal from these mines is known as "captive" coal and seldom is sold on the open market. In recent years the tendency, particularly by iron and steel companies, has been to reduce their purchases of commercial coal and increase the capacity of their captive mines. For example, the proportion of "captive" coal obtained by oven-coke plant operators increased from 56.8 percent in 1947–49 to 67.1 percent in 1954; declined slightly thereafter, averaging about 63 percent for the 4 years 1955–58; and in 1959 dropped further to 58.3 percent, because most of the captive mines were closed during the steel strike. As a result, the percentage of captive coal carbonized in 1959 was the lowest since 1952. Table 29 shows the quantity and percentages of captive coal received at merchant and furnace oven-coke plants in 1959 and earlier years.

Digitized by Google

TABLE 28.—Origin and destination of coal delivered to oven-coke plants in the United States in 1959, by States, in net tons

Consuming State	Coal produced in—							
	Alabama	Arkansas	Colorado	Illinois	Indiana	Kentucky	New Mexico	Ohio
Alabama	5,823,167							
California, Colorado, and Utah		224,277	1,266,922				53,936	
Illinois				490,071		1,283,928		
Indiana				167,422		4,081,117		
Kentucky, Tennessee, and Texas	88,867							
Maryland						515,645		
Massachusetts						306		
Michigan						1,165,616		
Minnesota						225,116		
New Jersey								
New York						303,333		
Ohio						977,136		
Pennsylvania						269,292		
West Virginia								
Connecticut, Missouri and Wisconsin						21,069		
Total 1959	5,912,034	224,277	1,266,922	657,493		8,842,558	53,936	
At merchant plants	665,114					21,375		
At furnace plants	5,246,920	224,277	1,266,922	657,493		8,821,183	53,936	
Total 1958	5,661,151	177,491	1,317,128	726,051	1,571	9,781,656	8,713	41,368

Consuming State	Coal produced in—Continued							
	Oklahoma	Pennsylvania	Tennessee	Utah	Virginia	West Virginia	Canada	Total
Alabama		25,393	190,157			321,385		6,360,102
California, Colorado, and Utah	241,504			2,161,394		854	29,371	3,978,256
Illinois		11,020			125,760	1,110,082		3,020,861
Indiana		44,096			918,054	4,416,555		9,627,244
Kentucky, Tennessee, and Texas	769,436	6,785	68,629		138,030	1,381,647		2,453,394
Maryland		313,856				2,212,014		3,041,515
Massachusetts						484,156		484,462
Michigan		325,587			425,833	2,747,905		4,664,941
Minnesota		20,405				735,919		981,440
New Jersey		15,258				823,295		838,553
New York		2,305,224			611,477	1,015,373		4,235,407
Ohio		3,654,860			1,158,042	6,646,334		12,436,372
Pennsylvania		11,179,535			806,244	7,434,156		19,689,227
West Virginia		3,242,148			91,246	1,042,281		4,375,675
Connecticut, Missouri, and Wisconsin		80,021			55,577	1,067,808		1,224,475
Total 1959	1,010,940	21,224,188	258,786	2,161,394	4,330,263	31,439,764	29,371	77,411,926
At merchant plants		412,181			446,951	8,186,966		9,732,587
At furnace plants	1,010,940	20,812,007	258,786	2,161,394	3,883,312	23,252,798	29,371	67,679,339
Total 1958	1,079,152	23,667,096	150,640	2,455,388	3,434,158	27,311,570	45,853	75,858,966

CONSUMPTION OF COKE

The apparent consumption of coke, allowing for imports, exports, and changes in producers' stocks, increased 4 percent over 1958 but was 30 percent below the 1951 peak. (See table 30.) Most of the coke consumed in the United States is used as fuel in blast furnaces. The long work stoppage in the iron and steel industry during the summer and fall of 1959 held down the quantity of coke used as blast-furnace fuel. Despite the long period when blast furnaces operated at reduced capacity, consumption in blast furnaces exceeded the 1958 figure by 1,642,706 tons, or 4 percent. The quantity used for other

Digitized by Google

TABLE 29.—Quantity and percentage of captive coal received by oven-coke plants in the United States, 1947–49 (average) and 1955–59, in net tons

Year	At merchant plants			At furnace plants			Total		
	Total coal received	Captive coal		Total coal received	Captive coal		Total coal received	Captive coal	
		Quantity	Percent		Quantity	Percent		Quantity	Percent
1947–49 (average)	18,321,004	5,286,361	28.9	76,138,301	48,371,093	63.5	94,459,305	53,657,454	56.8
1955	12,801,963	5,467,619	42.7	93,865,894	63,205,881	67.3	106,667,857	68,673,500	64.4
1956	13,407,253	5,740,551	42.8	90,740,999	59,378,485	65.4	104,148,252	65,119,036	62.5
1957	12,092,303	5,250,574	43.4	95,427,661	61,543,355	64.5	107,519,964	66,793,929	62.1
1958	8,985,366	3,839,880	48.1	66,873,620	44,605,122	66.7	75,858,986	48,445,002	63.9
1959	9,732,587	4,479,701	46.0	67,679,339	40,675,316	60.1	77,411,926	45,155,017	58.3

purposes increased 366,613 tons, or 6 percent. The use of coke for residential heating and gas manufacture decreased substantially, but the loss in tonnage for these purposes was more than offset by the increase in foundry and other industrial consumption. The decrease in consumption of coke for gas manufacture was due largely to the closing of the coke plant at Belle, W. Va., by the E. I. du Pont de Nemours and Co. This was the only plant in the United States in 1959 that made synthetic ammonia using coke as a starting material. During and after World War II, six synthetic-ammonia plants used coke, and they annually consumed about 1½ million tons of coke and produced about 50 percent of the synthetic ammonia in the United States. By the end of 1959, all but one of these plants had modified or converted their facilities to use natural gas in place of coke. The only synthetic-ammonia plant that had not converted to natural gas was the Government-owned plant at Morgantown, W. Va. This plant, which closed on June 30, 1958, was last operated by Olin Mathieson Chemical Corp. At the end of 1959, coke was used for water-gas manufacture only in small gas plants where the water gas was distributed for residential and commercial heating and cooking.

Blast furnaces consumed 88 percent of the apparent coke consumption of the Nation in 1959, according to the American Iron and Steel Institute. The coke-to-hot-metal ratio continued to decline, and for the first time on record less than 1,600 pounds of coke was used per ton of pig iron and ferroalloys (table 31). Improvements in the chemical and physical properties of coke, in ore beneficiation procedures, and in blast-furnace operating techniques have contributed to a 16-percent decrease in the coke-to-hot-metal ratio in the past 10 years. The amount of coke consumed per ton of pig iron and ferroalloys produced decreased from 1,895.8 pounds in 1949 to 1,587.6 pounds in 1959, a 308.2-pound decrease. (See fig. 2.) Continued improvement in the fuel efficiency of blast furnaces can be expected through further enrichment of iron ores, better fuels, and advances in blast-furnace technology.

Tables 32 and 33 summarize, by major end uses, the disposal of oven and beehive coke in 1959. Furnace plants used about 95 percent of their output for smelting iron ore in blast furnaces. Merchant or nonfurnace plants and beehive plants sell most of their output. Merchant plants supplied most of the coke used in iron foundries, for gas

Digitized by Google

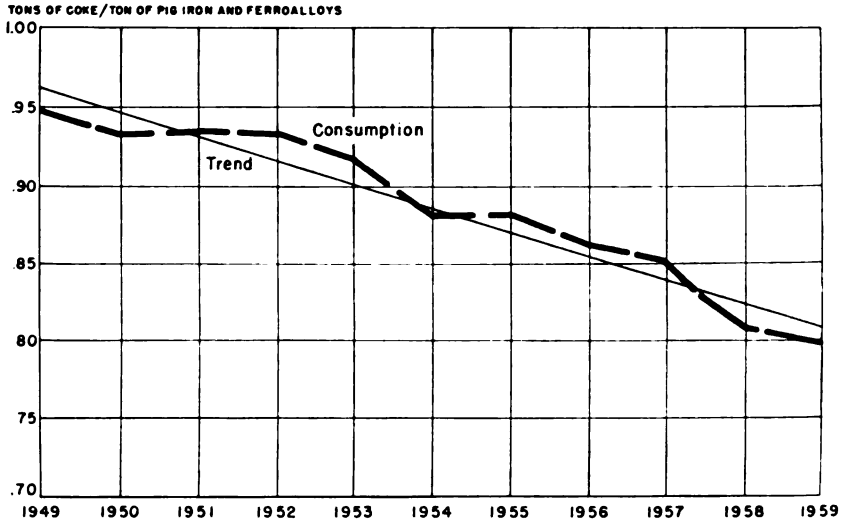

FIGURE 2.—Coke consumption per ton of pig iron and ferroalloys produced in blast furnaces, 1949–59.

manufacture, for miscellaneous industrial applications, and for residential heating. Beehive coke was sold mostly for metallurgical purposes; 75 percent of this coke was destined to blast furnaces and foundries.

DISTRIBUTION OF OVEN AND BEEHIVE COKE

Distribution of coke and breeze in 1959, by States and major uses, is summarized in table 34. Coke is used principally for smelting iron ore in blast furnaces. Blast-furnace coke generally is not moved long distances because most blast furnaces are integrated with coke ovens. In 1959, 89 percent of the coke charged into blast furnaces was produced within the consuming State.

TABLE 30.—Apparent consumption of coke in the United States, 1947–49 (average) and 1955–59, in net tons

Year	Total production	Imports	Exports	Net change in stocks	Apparent U.S. consumption [1]	Consumption			
						In iron furnaces [2]		All other purposes	
						Quantity	Percent	Quantity	Percent
1947–49 (average)	70, 648, 402	181, 000	696, 699	+280, 230	69, 852, 473	55, 877, 463	80. 0	13, 975, 010	20. 0
1955	75, 301, 826	126, 342	530, 505	−1, 248, 069	76, 145, 732	68, 506, 721	90. 0	7, 639, 011	10. 0
1956	74, 482, 526	130, 955	655, 717	+633, 670	73, 324, 094	65, 289, 270	89. 0	8, 034, 824	11. 0
1957	75, 950, 721	117, 951	822, 244	+814, 335	74, 432, 093	67, 580, 507	90. 8	6, 851, 586	9. 2
1958	53, 604, 102	121, 517	392, 817	+674, 588	52, 658, 214	46, 598, 980	88. 5	6, 059, 234	11. 5
1959	55, 863, 572	123, 255	460, 222	+859, 072	54, 667, 533	48, 241, 686	88. 2	6, 425, 847	11. 8

[1] Production plus imports minus exports, plus or minus net change in stocks.
[2] American Iron and Steel Institute; figures include coke consumed in manufacturing ferroalloys.

Digitized by Google

TABLE 31.—Coke and coking coal consumed per net ton of pig iron produced in the United States, 1913, 1918, 1929, 1939, 1947–49 (average), and 1957–59

Year	Coke per net ton of pig iron and ferro-alloys[1] (pounds)	Yield of coke from coal (per-cent)	Coking coal per net ton of pig iron and ferro-alloys (pounds calculated)	Year	Coke per net ton of pig iron and ferro-alloys[1] (pounds)	Yield of coke from coal (per-cent)	Coking coal per net ton of pig iron and ferro-alloys (pounds calculated)
1913	2,172.6	66.9	3,247.5	1947–49 (av.)	1,919.7	69.7	2,754.2
1918	2,120.7	66.4	3,193.8	1957	1,703.6	70.1	2,430.2
1929	1,838.0	69.0	2,663.8	1958	1,613.4	69.8	2,311.5
1939	1,778.0	69.8	2,547.3	1959	1,587.6	70.2	2,261.5

[1] American Iron and Steel Institute; consumption per ton of pig iron only, excluding furnaces making ferroalloys, was 2,172.6 pounds in 1913, 2,120.7 in 1918, 1,813.3 in 1929, 1,760.0 in 1939, 1,892.8 in 1947–49 (average), 1,684.1 in 1957, 1,597.9 in 1958, and 1,570.5 in 1959.

Unlike blast-furnace coke, coke shipments to foundries and other industrial plants are widespread and move from coast to coast. The principal consumers of foundry coke are the automotive, farm-machinery, machine-tool, heavy-machinery, railroad, and electrical-equipment industries. These industries are concentrated in such cities as Detroit, Flint, Chicago, Cleveland, Lorain, Birmingham, Pittsburgh, Buffalo, and Milwaukee and account for the large tonnages of foundry coke consumed in the States where these cities are located. Coke was shipped to other industrial plants in all but two States and the District of Columbia in 1959 for a wide variety of uses, such as nonferrous smelting, lime burning, beet-sugar refining, and manufacture of calcium carbide and rock wool. The use of coke in making calcium carbide has increased steadily, and it was estimated that about 600,000 tons was so used in 1959. The use of coke for residential heating and gas manufacture continued to decrease. Coke shipments for residential heating was the second largest outlet for coke in the late 1920's and throughout the 1930's but in 1959 only 1 percent was shipped for this purpose.

STOCKS OF COKE AND COKING COAL

Coke.—Producers' stocks of oven coke reached an alltime peak on November 30, 1959, when they totaled 5,157,985 net tons. This record was attributed mainly to the lengthy steel strike when most of the coke-consuming blast furnaces were banked. Normally, coke-plant operators attempt to keep stocks at a minimum by adjusting production to demand. There are limits, however, to the amount production can be curtailed without banking the ovens. During the strike many iron and steel plants operated their ovens at very low rates (just short of banking them) and stocked the coke produced. Merchant oven-coke plants were not able to dispose of all their production during this period, and stocks for this group of plants also increased. After the end of the strike, demand for coke exceeded production, and stocks declined 9 percent in December. At the end of the year coke stocks were 23 percent higher than they were on January 1 and equaled 24 days' production.

Coking Coal.—Bituminous-coal stocks at oven-coke plants decreased slightly in 1959 and at yearend were enough for 42 days at the pre-

Digitized by Google

TABLE 32.—Oven coke produced, used by producers, and sold in the United States in 1959, by States

State	Produced		Used by producing companies—				Commercial sales	
			In blast furnaces		For other purposes [1]		To blast-furnace plants	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Alabama	4,897,884	$96,476,915	3,862,784	$73,068,328	70,626	$1,890,774	115,216	(2)
California, Colorado, and Utah	2,311,248	57,105,887	2,266,313	56,033,097	6,505	130,621	----	----
Illinois	2,044,977	37,792,888	1,915,670	34,458,458	73,695	2,376,647	----	----
Indiana	6,892,972	118,009,645	6,231,151	102,428,303	19,512	286,965	82,561	(2)
Kentucky, Tennessee, and Texas	1,746,449	30,293,063	761,190	15,353,677	47,251	1,085,096	(2)	(2)
Maryland	2,402,312	(2)	2,417,088	(2)	5,767	(2)	----	----
Massachusetts	338,387	(2)	92,024	(2)	1,236	(2)	----	----
Michigan	3,265,252	60,750,009	2,239,648	(2)	277,892	5,997,123	(2)	(2)
Minnesota	695,536	14,475,829	469,831	(2)	6,816	135,467	----	----
New Jersey	615,001	(2)	----	----	72,604	(2)	(2)	(2)
New York	3,016,813	51,511,184	2,412,826	(2)	53,972	885,729	(2)	(2)
Ohio	8,840,750	147,945,010	7,634,835	124,213,837	133,255	2,907,013	516,198	$8,139,062
Pennsylvania	13,755,846	227,773,358	12,611,740	207,439,049	46,236	714,207	499,311	8,221,413
West Virginia	3,077,138	50,967,671	2,921,238	48,694,431	25,792	338,108	(2)	(2)
Connecticut, Missouri, and Wisconsin	858,711	20,867,045	----	----	49,698	903,996	155,856	2,406,155
Undistributed	----	62,375,382	----	130,965,133	----	1,331,410	1,414,017	25,534,124
Total 1959	54,789,276	976,313,886	45,836,378	793,254,313	890,857	18,983,176	2,783,159	44,300,754
At merchant plants	6,849,786	146,063,542	92,024	(2)	588,194	11,433,967	2,287,715	35,915,674
At furnace plants	47,939,490	830,280,344	45,744,354	(2)	302,663	7,549,209	495,444	8,385,080
Total 1958	53,005,730	966,794,538	44,927,950	807,603,546	1,187,289	21,029,097	2,359,053	36,249,668

Digitized by Google

State	Commercial sales—Continued							
	To foundries		To other industrial plants [4]		For residential heating		Total	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Alabama	485,102	$14,096,069	254,949	$3,970,965	31,634	(2)	886,901	$20,325,236
California, Colorado, and Utah	389	(2)	22,066	531,040	2	(2)	22,457	540,474
Illinois			34,195	394,100	4,449	$74,903	38,644	469,003
Indiana	404,509	(2)	87,817	1,564,889	32,113	477,391	607,000	15,431,228
Kentucky, Tennessee, and Texas	(2)	(2)	(2)	(2)	(2)	(2)	857,193	12,723,050
Maryland								
Massachusetts	63,317	(2)	39,653	(2)	106,646	(2)	209,616	(2)
Michigan	(2)	(2)	194,196	3,267,448	8,274	128,493	692,916	16,256,758
Minnesota	(2)	(2)	45,367	869,578	(2)	(2)	174,599	4,780,841
New Jersey	85,125	(2)	170,452	(2)	151,378	(2)	(2)	(2)
New York	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Ohio	266,619	7,996,082	173,209	2,500,953	10,027	144,485	966,053	18,780,582
Pennsylvania	198,936	6,045,399	219,993	2,729,238	34,868	520,977	953,108	17,517,027
West Virginia			(2)	(2)			87,606	1,251,918
Connecticut, Missouri, and Wisconsin	445,311	14,194,943	121,182	2,145,001	76,198	1,323,302	798,547	20,069,401
Undistributed	506,176	32,145,608	146,239	5,910,153	16,869	5,468,329	925,779	22,654,582
Total 1959	2,455,484	74,478,101	1,509,318	23,883,365	472,458	8,137,880	7,220,419	150,800,100
At merchant plants	2,269,607	68,998,531	874,020	15,505,307	454,289	7,911,368	5,885,631	128,330,880
At furnace plants	185,877	5,479,570	635,298	8,378,058	18,169	226,512	1,334,788	22,469,220
Total 1958	1,915,785	55,417,734	1,346,697	21,662,534	601,622	10,312,443	6,223,157	123,642,376

[1] Comprises 225,968 tons valued at $7,197,915 used in foundries; 93,374 tons, $1,586,512, to make producer gas; 84,669 tons, $1,337,911, to make water gas; and 486,846 tons, $8,860,838, for other purposes.
[2] Included with "Undistributed" to avoid disclosing individual company figures.
[3] Concealed to avoid disclosing individual company figures.
[4] Includes 48,362 tons valued at $878,287 to water-gas plants.

Digitized by Google

TABLE 33.—Beehive coke produced, used by producers, and sold in the United States in 1959, by States

State	Produced		Used by producing companies—				Commercial sales	
			In blast furnaces		For other purposes		To blast-furnace plants	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Pennsylvania	713,150	$10,415,475	47,430	$812,020	------	------	560,717	$8,341,980
Kentucky, Virginia, and West Virginia	361,146	5,325,451	------	------	------	------	189,530	3,009,099
Total 1959	1,074,296	15,740,926	47,430	812,020	------	------	750,247	11,351,079
Total 1958	598,372	8,395,199	------	------	------	------	310,822	4,629,540

State	Commercial sales—continued							
	To foundries		To other industrial plants		For residential heating		Total	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Pennsylvania	4,335	$72,069	99,232	$1,170,311	319	$4,673	664,603	$9,589,033
Kentucky, Virginia, and West Virginia	4,061	63,916	168,759	2,272,674	711	10,369	363,061	5,356,058
Total 1959	8,396	135,985	267,991	3,442,985	1,030	15,042	1,027,664	14,945,091
Total 1958	19,827	326,258	266,773	3,429,929	2,254	25,309	599,676	8,411,036

vailing rate of consumption. Bituminous-coal stocks are of utmost importance to oven-coke plant operators because of the continuous nature of the carbonizing process. Consequently, an adequate coal supply is imperative to insure continuous operation. A 30-day supply is the minimum desired by most oven-coke operators as a safeguard against disruption in the flow of coal to the ovens. However, coke plants on the upper lakes, which are supplied principally by boat, build up inventories during the shipping season to last throughout the winter when the lakes are frozen. These plants usually build a 4 or 5 months' supply by the end of the shipping season. In 1959, the steel strike affected coking-coal shipments, and coke plants on strike were unable to receive coal for the duration of the work stoppage. During this 4-month period (July–October) stocks declined to the lowest point since May 1950, averaging only 9.4 million tons. Coke producers started stocking coal in November after termination of the strike, and by the end of December stocks had increased almost 2 million tons. Tables 37 and 38 show stocks of bituminous and anthracite, by months, at oven-coke plants, 1955–59.

ASSIGNED VALUE AND PRICE

The average values and prices (receipts) of oven and beehive coke produced and sold, as reported by the producing companies, are shown in tables 39 and 40. The average values at plants of oven and beehive coke produced (which includes coke consumed by producing companies as well as coke sold) are based on reports from the producing

Digitized by Google

TABLE 34.—Distribution of oven and beehive coke and breeze in 1959, in net tons

[Based upon reports from producers showing destination and principal end use of coke used or sold. Does not include imported coke, which totaled 123,255 tons in 1959]

Consuming State	Coke						Breeze
	To blast-furnace plants	To foundries	To producer- and water-gas plants	To other industrial plants	For residential heating	Total	
Alabama	3,535,373	200,799		31,265	13,553	3,780,990	199,060
Arizona		311				311	74
Arkansas		943		3,947		4,890	62
California	803,907	61,204		38,191		903,302	62,669
Colorado	469,389	15,448		33,817	2	518,656	54,938
Connecticut		27,293	61,964	1,994	40,520	131,771	38,586
Delaware		881		1,300	98	2,279	6,398
District of Columbia		27				27	
Florida		3,817	5,880	6,441	444	16,582	29,043
Georgia		10,900		1,633	4,692	17,225	2,623
Idaho		225		49,690		49,915	45,331
Illinois	4,168,995	241,050		45,390	15,923	4,471,358	184,541
Indiana	5,145,287	151,540	8,016	68,205	28,278	5,401,326	473,266
Iowa		57,165		7,749	1,713	66,627	6,385
Kansas		13,435		137		13,572	75
Kentucky	437,271	33,551		261,683	9,983	742,488	31,223
Louisiana		2,561		63,070	162	65,793	1,783
Maine		1,179	17,486	38	5,959	24,662	
Maryland	2,563,633	19,571		5,930		2,589,134	136,049
Massachusetts	92,024	42,650	4,128	3,339	103,221	245,362	43,066
Michigan	2,895,269	557,176		271,641	6,019	3,730,105	232,054
Minnesota	466,142	23,602	5,492	20,196	6,616	522,048	31,427
Mississippi		1,148		79		1,227	56
Missouri		60,281		30,331	30	90,642	2,846
Montana		1,422		19,465		20,887	28,686
Nebraska		4,270		4,627		8,897	2,026
Nevada		30		4,400		4,430	3,756
New Hampshire		2,851		45	5 191	8,087	
New Jersey		57,384	70,740	60,383	116,082	304,589	72,015
New Mexico		223		200	90	513	95
New York	2,993,956	105,887		145,567	36,783	3,282,193	216,971
North Carolina		18,742	830	13,641	1,972	35,185	18,548
North Dakota		261		204		465	
Ohio	9,398,724	336,004		207,029	9,305	9,951,062	393,432
Oklahoma		4,922		1,212		6,134	3,252
Oregon		5,947		16,097		22,044	5,079
Pennsylvania	12,774,106	157,534	27,867	340,561	33,693	13,333,761	742,331
Rhode Island		9,552		317	5,428	15,297	
South Carolina		7,849		20,958	549	29,356	2,820
South Dakota		495		509		1,004	
Tennessee	144,741	66,726		54,783	1,672	267,922	180,306
Texas	650,553	69,326		85,679	1,277	806,835	71,132
Utah	993,017	15,877		18,040		1,026,934	76,211
Vermont		3,017		29	1,999	5,045	
Virginia	94,440	47,457		36,934	764	179,595	1,381
Washington		2,501		3,944		6,445	3,332
West Virginia	1,750,556	11,089	25,262	14,739	32	1,801,678	203,844
Wisconsin		165,053	1	8,406	18,317	191,777	6,954
Wyoming				3,327		3,327	
Total	49,377,383	2,621,176	227,666	2,007,162	470,367	54,703,754	3,613,726
Exported	39,831	68,672		207,370	3,121	318,994	21,952
Grand total	49,417,214	2,689,848	227,666	2,214,532	473,488	55,022,748	3,635,678

companies that showed receipts, f.o.b. plant, for commercial sales of coke and the prevailing market value assigned by the producer for coke consumed by the producing companies. The average value per ton of oven coke produced decreased $0.42 per ton or 2 percent, whereas the average unit value for beehive-coke production rose $0.62 or 4 percent. The average receipts per ton of coke sold (commercial sales) increased for both oven and beehive coke. The average price per ton on oven coke increased $1.02 per ton, or 5 percent, and reached a new peak. The average price per ton of beehive coke increased $0.51, or

Digitized by Google

TABLE 35.—Producers' stocks of coke and breeze in the United States on Dec. 31, 1959, by States, in net tons

State	Coke				Breeze
	Blast furnace	Foundry	Residential heating and other	Total	
Oven coke:					
Alabama	666,674	9,250	37,489	713,413	42,466
California, Colorado, and Utah	212,930			212,930	22,720
Illinois	103,284	4,414	1,576	109,274	11,022
Indiana	309,237	255	8,371	317,863	920,264
Kentucky, Tennessee, and Texas	46,808	1,411	74,774	122,993	3,874
Maryland	61,427			61,427	44,557
Massachusetts	82,102	2,515	92,836	177,453	
Michigan	88,496	3,110	30,193	121,799	35,510
Minnesota	91,143	8,954	24,396	124,493	28,048
New Jersey	288,519	1,637	309,471	599,627	17,222
New York	250,240		5,945	256,185	83,539
Ohio	439,675	12,739	70,875	523,289	142,074
Pennsylvania	953,594	3,446	1,181	958,221	290,487
West Virginia	61,186			61,186	9,201
Connecticut, Missouri, and Wisconsin	126,796	105,726	79,527	312,049	8,898
Total 1959	3,782,111	153,457	736,634	4,672,202	1,660,174
At merchant plants	821,551	146,677	717,435	1,685,663	87,326
At furnace plants	2,960,560	6,780	19,199	2,986,539	1,572,848
Total 1958	3,084,394	135,934	592,188	3,812,516	1,498,891
Beehive coke:					
Pennsylvania	9,402			9,402	
Kentucky, Virginia, and West Virginia	231		601	832	722
Total 1959	9,633		601	10,234	722
Total 1958	9,411	522	915	10,848	12,013

4 percent, but was 2 percent below the record established in 1957.

Table 40 shows the weighted average prices by grades for commercial sales of oven and beehive coke. Prices of oven coke sold to blast furnaces and foundries and for residential heating increased, however, the average prices on sales to other industrial plants decreased. Prices on sales of beehive coke for blast-furnace use and residential heating increased, but the prices for foundries and other industrial plants were lower. However, beehive-coke prices are always much lower than oven-coke prices because coal costs are lower.

TABLE 36.—Producers' month-end stocks of oven coke in the United States, 1958–59, in net tons

[Includes blast-furnace, foundry, and residential-heating coke]

Month	At merchant plants		At furnace plants		Total	
	1958	1959	1958	1959	1958	1959
January	1,026,721	1,426,953	2,273,117	2,365,714	3,299,838	3,792,667
February	1,034,856	1,434,710	2,312,189	2,301,668	3,347,045	3,736,378
March	1,132,936	1,429,303	2,345,529	2,217,662	3,478,465	3,646,965
April	1,242,655	1,381,255	2,478,674	2,131,101	3,721,329	3,512,356
May	1,306,058	1,319,564	2,580,104	1,953,885	3,886,162	3,273,449
June	1,345,563	1,257,204	2,531,074	1,792,285	3,876,637	3,049,489
July	1,397,766	1,335,556	2,584,758	1,983,614	3,982,524	3,319,170
August	1,419,208	1,514,743	2,587,970	2,429,114	4,007,178	3,943,857
September	1,415,982	1,652,464	2,577,462	2,835,838	3,993,444	4,488,302
October	1,389,492	1,728,528	2,506,768	3,256,891	3,896,260	4,985,419
November	1,400,028	1,760,116	2,481,522	3,397,869	3,881,550	5,157,985
December	1,401,726	1,685,663	2,410,790	2,986,539	3,812,516	4,672,202

Digitized by Google

TABLE 37.—Month-end stocks of bituminous coal at oven-coke plants in the United States, 1955–59, in net tons

Month	1955	1956	1957	1958	1959
January	11,506,274	12,561,742	12,796,209	13,217,378	12,123,513
February	11,065,243	12,341,898	12,801,976	12,096,279	11,801,729
March	10,776,055	12,839,544	13,254,278	11,906,462	11,684,173
April	10,693,689	12,865,107	13,285,465	11,781,534	11,569,096
May	11,515,962	13,605,645	13,895,620	11,585,237	11,837,123
June	12,745,576	14,004,567	13,978,054	11,787,762	12,424,398
July	12,342,332	13,060,538	11,717,007	10,039,582	9,566,108
August	13,665,828	13,366,033	12,503,701	10,118,979	9,394,516
September	13,993,102	13,521,835	13,006,022	10,523,274	9,261,161
October	13,892,194	14,005,637	13,935,303	11,666,111	9,375,872
November	13,603,970	14,093,446	14,002,603	12,335,715	10,127,812
December	13,342,972	13,893,561	14,092,205	12,939,358	11,495,611

TABLE 38.—Month-end stocks of anthracite at oven-coke plants in the United States, 1955–59, in net tons

Month	1955	1956	1957	1958	1959
January	46,725	57,683	129,330	118,859	87,314
February	37,982	41,748	127,418	101,751	71,101
March	26,745	29,469	119,472	89,855	49,463
April	31,861	30,301	114,369	82,121	61,706
May	40,726	40,024	110,412	81,514	73,204
June	53,248	52,716	125,664	82,716	84,874
July	55,974	59,886	111,649	73,007	74,957
August	55,529	95,156	134,686	91,358	95,529
September	59,886	85,754	147,258	97,399	96,480
October	63,243	113,610	145,879	112,265	106,230
November	73,281	138,879	145,051	113,980	117,243
December	80,464	146,581	138,085	103,599	108,893

TABLE 39.—Average value per net ton of coke produced and average receipts per net ton from coke sold (commercial sales) in the United States, 1947–49 (average) and 1955–59

Year	Value per ton produced [1]			Receipts per ton sold		
	Oven coke	Beehive coke	Total	Oven coke	Beehive coke	Total
1947–49 (average)	$12.08	$11.32	$12.02	$13.87	$11.95	$13.41
1955	16.30	12.94	16.23	16.80	12.88	16.28
1956	17.70	14.16	17.58	18.39	14.11	17.64
1957	18.31	14.92	18.21	19.51	14.90	18.71
1958	18.24	14.03	18.19	19.87	14.03	19.35
1959	17.82	14.65	17.76	20.89	14.54	20.09

[1] Beginning in 1954, figures are based on market values; therefore, they are not comparable with values shown for preceding years.

FOREIGN TRADE [4]

Imports.—Coke imports averaged about 124,000 tons per year for the 5 years 1954–58 and were slightly below this average in 1959. Coke imports are very small compared with national production but are important to some areas of the United States where no other coke is available. All but a small quantity (110 tons) of the coke imported in 1959 originated in Canada. Most of the Canadian coke entered

[4] Figures on imports and exports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the Bureau of the Census.

Digitized by Google

TABLE 40.—Average receipts per net ton of coke sold (commercial sales) in the United States, 1947–49 (average) and 1955–59, by uses

Year	Oven coke				Beehive coke			
	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating	To blast-furnace plants	To foundries	To other industrial plants [1]	For residential heating
1947–49 (average)	$13.02	$17.61	$12.70	$12.49	$11.59	$13.93	$12.46	$10.98
1955	14.33	23.75	12.97	15.10	12.57	15.05	13.62	10.75
1956	15.70	26.50	14.35	16.30	14.02	16.58	14.31	12.41
1957	16.08	28.77	15.74	17.12	14.63	17.03	15.75	10.68
1958	15.37	28.93	16.09	17.14	14.89	16.46	12.86	11.23
1959	15.92	30.33	15.82	17.22	15.13	16.20	12.85	14.60

[1] Includes water-gas plants.

TABLE 41.—Average monthly prices per net ton of furnace and foundry beehive coke and foundry oven coke in the United States in 1959 [1]

	January-December		January-December
Beehive coke, at ovens:		Oven foundry coke, at ovens—Con.	
Connellsville furnace	$14.75–15.25	Kearny	$31.25
Connellsville foundry	18.00–18.50	Milwaukee	32.00
Oven foundry coke, at ovens:		Painesville	32.00
Birmingham	30.35	Philadelphia	31.00
Detroit	32.00	St. Louis	33.00
Everett [2]	33.55	St. Paul	31.25
Indianapolis	31.25	Swedeland	31.00

[1] As quoted by Steel Magazine.
[2] New England delivered or within $5.15 freight zone from works.

the United States through the Montana and Idaho, Michigan, and Buffalo customs districts. Table 42 gives import data, by country and customs district.

Exports.—Exports of coke, including breeze, increased 17 percent over 1958 but were only about half as large as in 1957. Exports to all countries other than Canada totaled less than 100,000 tons, or less than half a day's production of oven coke. Exports to Canada comprised 82 percent of the total. They moved mainly through the Buffalo and Michigan customs districts and were used principally in metallurgical applications (blast furnaces and foundries).

Exports to South America dropped slightly from 1958. Exports to Europe were negligible, amounting to only 559 tons valued at $15,771. Shipments to Europe reached a peak in 1951 when 354,302 tons went to Western European countries. Exports to Asia jumped from 302 to 9,209 tons, mainly because of a cargo shipped to Korea. However, no shipments were reported for Oceania. That area had averaged over 20,000 tons per year in 1957–58. Details on exports are shown in table 43.

TECHNOLOGY

One of the significant developments in carbonization research in the United States in the past several years has been the construction, by private companies, of pilot-scale test ovens and related facilities to make extensive evaluation studies of coal, coke, and coal chemicals.

Digitized by Google

TABLE 42.—Coke imported for consumption in the United States, 1957–59, by countries and customs districts

[Bureau of the Census]

	1957		1958		1959	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
Canada	117,641	$1,526,787	121,474	$1,570,121	123,145	$1,437,937
Mexico			43	618		
Total	117,641	1,526,787	121,517	1,570,739	123,145	1,437,937
Europe:						
Germany, West	302	16,312				
Netherlands					110	3,325
United Kingdom	8	420				
Total	310	16,732			110	3,325
Grand total	117,951	[1] 1,543,519	121,517	1,570,739	123,255	1,441,262
CUSTOMS DISTRICT						
Buffalo	12,056	193,720	12,351	184,828	14,433	158,825
Dakota	4,167	42,911	1,652	20,394	207	1,784
Duluth and Superior	1,629	25,735	126	1,356		
Galveston	45	739				
Hawaii	302	16,312			110	3,325
Laredo			43	618		
Maine and New Hampshire	177	3,063	66	1,152	126	2,209
Michigan	27,929	271,122	32,494	304,642	47,895	406,817
Montana and Idaho	71,341	985,158	58,611	841,217	52,950	769,924
New York	8	420				
Rochester			112	1,497		
St. Lawrence	14	266				
Vermont	193	3,375	123	2,168	127	2,033
Washington	90	698	15,939	212,867	7,407	96,345
Total	117,951	[1] 1,543,519	121,517	1,570,739	123,255	1,441,262

[1] Not comparable to other years because of certain changes in procedures for shipments valued at $250 or less.

These miniature coke ovens are important tools in coal and coke research because carbonization tests can be conducted, for comparison with commercial practice, under conditions that permit a flexibility of operation and a precision of control and measurement that could not be achieved with commercial ovens. In the United States, the Federal Bureau of Mines, Illinois Geological Survey, Koppers Co., Wilputte Coke Oven Div. of Allied Chemical Corp., and a few of the steel companies, including United States Steel Corp., Bethlehem Steel Co., and Jones and Laughlin Steel Corp., have used pilot-scale test ovens for years. In 1959, three major coal producers constructed coal research laboratories featuring pilot-scale test ovens. The Eastern Gas and Fuel Associates, one of the first coal-producing companies to install and operate test ovens, expanded their coal research laboratory at Everett, Mass. Among new equipment added to the laboratory in 1959 was a new specially designed pilot-scale coke oven with a movable sidewall. The new oven has a coal capacity of 500 pounds per charge and is heated by 12 electrical units, each controlled by a separate autotransformer. This pilot-scale test oven is known as the coke-research oven. In the oven, flue temperatures can be controlled precisely to simulate full-scale-oven coking time, and wall pressures

Digitized by Google

TABLE 43.—Coke exported from the United States, 1957–59, by countries and customs districts

[Bureau of the Census]

	1957		1958		1959	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
Canada	628,950	$10,230,477	302,301	$5,147,752	379,466	$6,967,478
Mexico	11,846	206,895	4,005	140,934	4,648	171,967
Panama	100	7,272	203	10,470	150	10,371
West Indies:						
Cuba	14,465	384,418	22,501	512,944	26,383	538,553
Trinidad and Tobago	125	4,064	97	2,348	220	4,783
Other West Indies	238	11,031	197	9,420	136	8,994
Other North America	214	7,717	260	13,861	30	1,405
Total	655,938	10,851,874	329,564	5,837,729	411,033	7,703,551
South America:						
Argentina	53,932	1,156,174			5,536	83,524
Bolivia			61	3,018	337	10,667
Brazil	46,488	987,523	41,514	851,225	31,055	646,013
Chile	634	22,993	150	6,675	2,270	35,632
Ecuador	192	11,435	128	5,729	78	3,685
Peru	181	7,861	55	2,365	68	2,800
Venezuela	92	4,404	175	11,263	16	533
Other South America	344	7,877	290	6,172	61	2,856
Total	101,863	2,198,267	42,373	886,447	39,421	785,730
Europe:						
Finland	99	3,183				
Germany, West	15	1,515	22	1,220		
Greece	2,029	42,778	1,004	21,046		
Norway					15	630
Portugal			331	10,758		
Spain			97	2,445		
Sweden	7,383	152,920	10	1,288	539	14,553
United Kingdom					5	588
Total	9,526	200,396	1,464	36,757	559	15,771
Asia:						
Hong Kong					378	13,500
Japan	27,326	480,543	5	779	3	507
Korea, Republic of	2,460	89,680			8,118	134,998
Philippines	799	25,331	160	4,560	710	19,525
Other Asia			137	5,910		
Total	30,585	595,554	302	11,249	9,209	168,530
Oceania:						
Australia			112	5,550		
French Pacific Islands	24,332	510,403	19,002	348,976		
Total	24,332	510,403	19,114	354,526		
Grand total	822,244	14,356,494	392,817	7,126,708	460,222	8,673,582
CUSTOMS DISTRICT						
Buffalo	196,837	3,571,046	79,643	1,489,449	113,894	2,115,497
Dakota	13,850	367,046	20,138	492,418	10,567	299,903
Duluth and Superior	12,842	277,655	8,232	190,623	6,764	173,588
Florida	2,555	92,117	2,121	77,971	938	34,372
Laredo	3,222	112,013	3,218	112,275	3,481	124,060
Los Angeles	19,797	175,276				
Maryland	7,817	170,000	105	2,224	396	15,064
Massachusetts	69,393	1,445,938	8,028	167,000	15,120	280,475
Michigan	323,441	5,191,596	142,309	2,431,290	190,252	3,710,820
Mobile	3,810	118,059	395	18,256	904	35,139
New Orleans	2,096	87,581	3,273	109,149	2,359	47,721
New York	17,293	447,463	18,479	381,454	49,156	973,346
Ohio	44,000	301,400	21,544	169,290	20,000	166,250
Philadelphia	48,510	1,031,323	52,343	1,029,266	7,113	147,994
St. Lawrence	10,011	183,851	9,050	147,326	8,109	140,195
San Diego	625	20,815	465	15,168	987	38,880
Virginia	2,682	57,963	1,311	28,080	220	4,783
Washington	2,971	88,880	2,083	63,768	3,194	107,109
Wisconsin	33	994			14,824	128,983
Other districts	40,449	615,478	20,080	201,701	11,944	129,403
Total	822,244	14,356,494	392,817	7,126,708	460,222	8,673,582

Digitized by Google

developed by the test blend can be measured simultaneously. Eastern Gas and Fuel Associates has three other miniature coke ovens.

The Island Creek Coal Co. completed a new coal research center at Holden, W. Va., in 1959. An 18-inch, movable-wall, 700-pound test oven was installed, as this company wanted to produce foundry coke of normal size and shape to serve the foundry trade as well as pig-iron producers. The physical qualities of the foundry and blast-furnace cokes produced in the test ovens correlated well with the qualities of coke from commercial ovens.

Pittston Co. constructed a coal-testing and research laboratory equipped with a pilot-scale movable-wall oven at Dante, Va. Among carbonization studies which this company started in 1959 was an investigation on the variability in coking characteristics of various coals. The changes in carbonizing characteristics of coals subjected to controlled oxidation were studied. These changes were to be correlated with stockpiling problems at industrial sites. New European tests, such as the Arnu test for measuring the coking properties of coal, were also studied.

In addition to these companies, the Consolidation Coal Co. for several years has operated a research laboratory at Library, Pa., that is equipped with various carbonization and coke-testing apparatus.

Foreign countries also used pilot-scale test ovens. In 1959 the British Coke Research Association completed its first full year in the new coke-research center at Chesterfield. In addition to chemical and physical laboratories, this center features a 10-ton test oven with recovery equipment. An oven of this size was built so that enough coke could be made for testing in a blast furnace. At least 100 tons of coke is required for such tests. About 40 percent of the center's research activities in 1959 was devoted to improving the quality and yield of coke; 11 percent to the thermal behavior of coal and the fissuring of coke; 6 percent to the primary structure and reactivity of coke; 6 percent to the microstructure and mechanical properties of coke; and the remaining 37 percent to resistance of beds of coke to flow of gas and methods of analyzing and measuring this resistance, liquid effluents and atmospheric pollution studies, new methods of making blast-furnace coke, and the use of oven coke in domestic applications.

In France the Centre d'Etudes et Recherches des Charbonnages de France (CERCHAR) operates an experimental coke plant at Marienau. In 1959, this organization started research on the predrying of coking coal. This project was expected to take 3½ to 4 years, and part of the expenditures were to be supplied by the High Authority of the European Coal and Steel Community. The tests, which are to be carried out at the Marienau experimental coke plant, involve the preheat treatment of coal to approximately 300° C. and the handling of hot and dry coking blends. The coals are to be preheated in a fluidized-bed apparatus developed at Marienau in 1959 and in a cyclone heat exchanger. Studies on factors effecting coke strength and the reactivity of foundry coke were continued.

In West Germany, the Steinkohlenbergbauverein of Essen has an experimental coke plant comprising a battery of five industrial-scale coke ovens with an aggregate throughput of 100 to 120 metric tons of

Digitized by Google

coal per day and semi-industrial ovens with a chamber capacity of 0.315 cubic meter. In 1959, this research organization was granted financial assistance by the High Authority of the European Coal and Steel Community to conduct a carbonization project to study optimum coking-plant operating conditions, with emphasis on increasing the output of metallurgical coke. The objective of this project was to ascertain under what conditions coke ovens could be operated to produce a maximum quantity of coke of the highest quality. To insure that the results would be conclusive and as nearly operational as possible, the experiments were to be conducted in conjunction with industrial-scale tests using the same coking coal. All tests were to be accompanied by the usual petrographical and technical studies, including proximate analysis, determination of coking power, and examination of plasticity.

The new research center at Essen was completed in 1958 and concentrated all research laboratories that had been scattered over the Ruhr district. Research on coal carbonization is broken down into three large divisions as follows: The Chemistry Division; the Physics, Petrography, and Mineralogy Division; and the Coal and Coke Division.

Work in the Chemistry Division relating to coal and coke products included studies on effective economic methods of converting toluene to terephthalic acid. Studies were made on the production of new products by pressure oxidation of coal with nitric acid. Research was conducted on the utilization of special cokes made from oxidized pitch, the evaluation of graphitized carbons made from coal extracts, and the development of plastics from xylene-based pyromelletic acid and its byproducts.

The Division of Physics, Petrography, and Mineralogy studied coking coals according to macerals, bands, and coal types with emphasis on macerals analysis to characterize potential coking behavior. The work included the effect of variations in petrographic composition on coke quality, especially strength and reactivity.

The Division of Coal and Coke studied the influence of the heating velocity in the plastic zone and the finished temperature on the mechanical properties of coke.

Research on coal carbonization conducted by the Bureau of Mines in 1959 covered a wide range of problems. The Bureau's coal-carbonization research studies are conducted principally in laboratories at Pittsburgh, Pa., Denver, Colo., and Tuscaloosa, Ala. These three laboratories use carbonizing equipment that differs in design and operating techniques. The selection of carbonizing equipment used at the laboratories was dictated by historical and local conditions. In 1959, the Bureau made a systematic study to correlate the results obtained in the different types of equipment. Four coals used in commercial coke plants were tested by the three laboratories. Each laboratory used its standard equipment and procedures. Pittsburgh used 10- to 18-inch circular retorts, Denver a 14-inch test oven, and Tuscaloosa, a 17-inch experimental coke oven. The test results showed excellent agreement in the physical properties of the coke and indicated that, for the coal tested, the Bureau of Mines-American Gas Association (BM–AGA) 18-inch circular retort used at Pittsburgh,

Digitized by Google

the 14-inch slot-type oven used at Denver, and the 17-inch slot-type oven used at Tuscaloosa were approximately equal for evaluating coals for coke production. Results of the study will be published in the near future.

The Bureau at its Denver Coal Research Laboratory developed an easy method for measuring coal plasticity which provides temperature data that correlate closely with temperature data obtained from the more complex plastometer test. This method, using a dilatometer (known as the Parry-Potter), measures the expansion and contraction properties of coal under heat.

The carbonization-assay test procedure used at Denver, originally reported in 1953, was modified to provide for carbonization under pressure (100 p.s.i.g.). Preliminary tests indicated that higher char and gas yields and a lower tar yield were obtained from lignite and subbituminous coal than were obtained at atmospheric pressures. A technique that may permit the fluidized carbonization of coking coal in low-density beds, without preoxidation or heavy-char recirculation, was evaluated in preliminary pilot-plant runs.

Studies on the dry quenching of coke were conducted at the Bureau's Tuscaloosa laboratory. Six coals and blends, carbonized at flue temperatures of 2,000° and 2,400° F., were quenched by wet and dry methods. The results indicated that dry quenching yields coke which is slightly larger, more resistant to breakage by impact forces, less resistant to breakage by abrasive forces, and similar in chemical analysis to cokes obtained by wet quenching.

Studies of coal expansion and coke formation were carried out in the scale-heated ovens at Tuscaloosa. For binary blends the expansion results were nonadditive in behavior, and both positive and negative deviations from additive behavior were obtained, depending on the coal. The effect of the addition of inerts on the expansion behavior of coals could be predicted from the amount of inerts and the specific gravity of the inerts. Dense inerts, such as coke breeze, anthracite fines, and particularly iron ore, markedly reduced coal expansion. Some low-density inerts increased expansion properties.

Laboratory studies were made on the theory and practice of mixing particulate solids. These studies were to provide information about the mechanism of solids mixing, and attention was given to determining the effect of mixer design and operating variables on mixing rates for horizontal drum-type mixers using model systems.

In the continuing survey of carbonizing properties of American coals using the BM–AGA apparatus, 12 coals from Pennsylvania, 8 from West Virginia, and 4 from Virginia were tested at the Pittsburgh laboratory. Studies were made to determine the effect of cleaning on carbonizing properties. These tests showed that the cleaning of Upper Freeport coal at specific gravities of 1.80, 1.60, and 1.45 increased 1-inch and ¼-inch tumbler indexes and decreased ash content.

A series of comparative tests were made at Pittsburgh on industrially produced cokes, using American Society for Testing Materials (ASTM) shatter and tumbler procedures and micum-test methods. The micum test is used extensively in Europe to evaluate the mechanical strength of coke, and micum values are usually included in speci-

Digitized by Google

fications or coking coals for export to the European market. The test consists of tumbling 110 pounds of coke, larger than 600 millimeters (round holes), for 100 revolutions at 25 r.p.m. in a drum 39⅜ inches in diameter and length. Four lifters, 4 inches wide, which extend the length of the drum, are equally spaced on the interior surface of the drum. After tumbling, the percentages of coke retained on the 40-millimeter (round-hole) sieve and passing the 10-millimeter (round-hole) sieve are taken as the significant indexes.

Results for five furnace cokes showed a high degree of correlation for the percentage retained on the 40-millimeter round-hole sieve with the 2-inch ASTM shatter, the 1½-inch shatter, and the 1-inch tumbler tests. Correlation between the 10-millimeter micum and the ASTM ¼-inch tumbler tests was poor.

Carbonization research in Canada dealt primarily with the assessment of Canadian coking coals for use in the production of metallurgical cokes and with the testing of foreign coals. Work was underway to produce a high fixed-carbon product from Alberta coals that would be acceptable as a reductant in the phosphorus industry.

Southern Research Institute at Birmingham, Ala., erected and operated a pilot plant for fluidized carbonization of coal. Low-temperature tar from this plant was used in a preliminary evaluation of various means of utilizing or converting tar, determining approximate yields of salable products, revealing research procedures that should be followed, and establishing an approximate price for the tar in terms of processing costs and prices of marketable products.

Refining low-temperature lignite tar in a large-scale pilot plant was described in a report issued by the Bureau of Mines. The work on which this report is based was conducted several years ago at Rifle, Colo., under a cooperative agreement between the Bureau and the Koppers Co., Inc. This study established that primary low-temperature tar produced from a Texas lignite was stable enough to be processed in a conventional tube heater and flash fractionater. Further utilization of this lignite tar, produced in the prototype carbonizer at Rockdale, Tex., was carried out by Battelle Memorial Institute. To develop methods for using these tar products commercially, Battelle developed a method of processing in which a rough separation of tar acids and hydrocarbons was made by dual-solvent (aqueous methanol and hexane) extraction of the tar. Most of the laboratory processing was done in a small glass rotating-disk contactor set up for continuous countercurrent extraction.

Koppers Co., Inc., investigated the effects of preheating high-oxygen coals before carbonization on the properties of the resultant coke. The coals were preheated with superheated steam by modifying the regular coal-charging hopper used with the movable-wall test oven. The preheated coal was charged into the movable-wall laboratory test ovens. The study showed that a substantial improvement can be made in coke quality by preheating high-oxygen coals. Although this result confirmed laboratory studies made by various individuals and organizations in past years, the practice was not adopted by coke-plant operators because suitable equipment for heating and handling hot fine coal at coke plants had not been developed. In a paper sum-

Digitized by Google

marizing the Koppers' study, the company indicated that the development of fluidizing techniques should simplify the heating of large volumes of coal. Koppers also described two recently patented systems of charging the hot fine coal which appear to be suitable.

The study of the thermal decomposition characteristics of high-molecular-weight material was continued to establish the mechanism of tar formation and cracking. A résumé of these and other special carbonization studies conducted by the Bureau of Mines will be published in the forthcoming annual report of research and technologic work on coal and coal products.

An annual world review on the pyrolysis of coal and shale was published in the September 1959 issue of Industrial and Engineering Chemistry. This review summarized research and technologic studies relating to the following phases of coal pyrolysis: (1) Mechanism, kinetics, and thermochemistry; (2) low- and high-temperature carbonization; and (3) oven operations, products, and byproducts.

WORLD REVIEW [6]

World production of hard, or metallurgical, coke increased 3 percent but was 1 percent below the record output of 1957. Production of hard coke increased in most Communist countries, the largest increases in volume being registered by China and the U.S.S.R. The U.S.S.R., for the second consecutive year, led the world in production; output increased about 10 million tons between 1955 and 1959, a gain of 22 percent. Production in the United States, the second-ranking coke-producing country in 1959, was curtailed by a 116-day work stoppage in the iron and steel industry. Despite the loss in production because of the strike, output increased 4 percent over 1958 but was 3 million tons less than Soviet production. The largest loss in production was in West Germany where output decreased about 5.5 million tons. Communist China continued to surge forward in coke production, and the 4.5-million-ton increase enabled this country to assume fourth place among world producers.

Production rose in North America, Asia, and Africa but declined in South America, Europe, and Oceania. Europe continued to lead all continental groups, producing 64 percent, or nearly two-thirds, of the estimated world total. The North American countries produced 21 percent; Asia, 13 percent; and South America, Africa, and Oceania, the remaining 2 percent. Table 44 shows available statistics on the production of coke by countries.

Table 45 shows coke produced in gas retorts, by low- and medium-temperature carbonization processes, or from lignite or brown coals. Approximately one-fifth of the coke made by these processes was produced in coal-gas retorts in the United Kingdom. East Germany is known to be a large producer of coke from lignite and coal-gas retorts, and estimates placed this country second to the United Kingdom. Other large producers were Japan, Czechoslovakia, and India.

[6] Figures on world production compiled by Pearl J. Thompson and Berenice B. Mitchell, Division of Foreign Activities, Bureau of Mines.

Digitized by Google

TABLE 44.—World production of oven and beehive coke (excluding breeze), 1955–59, by countries, in thousand net tons [1]

Country	1955	1956	1957	1958	1959
North America:					
Canada	3,714	4,006	3,803	3,314	4,095
Mexico	498	633	755	657	751
United States	75,302	74,483	75,951	53,604	55,863
Total	79,514	79,122	80,509	57,575	60,709
South America:					
Brazil	530	525	568	634	574
Chile	260	[3] 440	[3] 470	[3] 440	[3] 440
Colombia	276	276	192	331	344
Peru	[3] 30	26	34	36	35
Total	1,096	1,267	1,264	1,441	1,393
Europe:					
Austria	1,996	2,304	2,414	2,082	1,736
Belgium	7,275	8,014	7,888	7,613	7,955
Bulgaria	11	11	13	11	[3] 17
Czechoslovakia	7,716	8,077	8,251	8,124	[3] 9,000
France	11,861	13,545	13,899	13,742	14,550
Germany:					
East [4]	505	807	862	1,097	[3] 1,100
West [5]	44,667	47,879	50,367	48,036	42,470
Hungary	33	96	289	410	434
Italy	3,256	3,760	4,064	3,704	3,366
Netherlands	4,300	4,688	4,721	4,545	4,500
Poland	[6] 11,063	[6] 11,574	11,156	11,722	11,992
Rumania	159	282	480	621	671
Saar	4,342	4,636	4,766	4,603	4,890
Spain	1,601	1,818	2,077	2,261	2,652
Sweden	137	147	131	103	133
U.S.S.R.	48,100	51,400	53,610	56,100	58,860
United Kingdom	20,276	22,001	22,950	20,665	19,045
Yugoslavia	806	1,017	1,143	1,135	1,179
Total	168,104	182,056	189,081	186,574	184,550
Asia:					
China [3]	5,000	6,100	7,400	19,800	24,300
India	2,908	2,806	2,872	3,380	2,388
Iran [7]	8	10	10	10	[3] 10
Japan	5,198	5,997	6,910	6,510	7,848
Korea, North [3]	440	440	440	470	500
Taiwan	146	129	162	203	190
Turkey	603	554	603	614	583
Total	14,300	16,040	18,400	30,990	35,820
Africa:					
Rhodesia and Nyasaland, Federation of: Southern Rhodesia	209	240	255	[3] 240	[3] 240
Union of South Africa	1,544	1,626	1,770	1,980	2,205
Total	1,753	1,866	2,025	2,220	2,445
Oceania:					
Australia	2,240	2,497	2,549	2,574	2,334
New Caledonia [3]	80	78	78	78	77
New Zealand	7	7	7	7	[3] 7
Total	2,327	2,582	2,634	2,659	2,418
World total	267,094	282,933	293,913	281,459	287,335

[1] Includes revisions of data published previously.
[3] Estimated.
[3] Planned production.
[4] "High-temperature coke" from lignite.
[5] Includes electrode coke.
[6] Includes gashouse and low-temperature coke.
[7] Year ended March 20 of year following that stated.

Digitized by Google

TABLE 45.—World production of gashouse, low- and medium-temperature coke (excluding breeze), 1955–59, by countries, in thousand net tons [1]

Country [2]	1955	1956	1957	1958	1959
North America:					
Canada	(3)	60	(3)	(3)	(3)
United States, retort, low- and medium-temperature	(3)	182	(3)	(3)	(3)
Total	310	355	280	285	275
South America:					
Argentina [4]	55	60	55	60	60
Chile	119	117	95	[4] 95	[4] 95
Peru, medium-temperature	4				
Uruguay	34	33	32	33	31
Total	212	210	182	188	185
Europe:					
Austria	478	497	445	357	276
Belgium	10	1	4	4	
Czechoslovakia: [4]					
Gashouse	840	855	855	865	870
Lignite	1,970	2,000	2,040	2,060	2,060
Denmark	445	435	422	340	369
Finland	96	107	118	143	143
France:					
Gashouse [5]	1,908	1,778	1,690	1,457	1,112
Low-temperature	333	335	310	304	317
Germany:					
East:					
Gashouse	2,982	3,081	[4] 3,080	[4] 3,080	[4] 3,080
Lignite	7,020	7,075	[4] 7,300	[4] 7,500	[4] 7,800
West:					
Gashouse	5,581	6,336	6,019	5,469	5,526
Lignite	685	645	643	660	655
Greece	26	24	90	23	[4] 28
Hungary	499	466	498	517	529
Ireland (Eire)	212	213	205	205	207
Italy	1,095	1,103	1,025	913	879
Luxembourg	40	41	40	40	35
Netherlands	958	859	725	625	456
Norway [6]	64	66	62	62	[4] 50
Poland:					
Gashouse	[4] 1,050	[4] 1,070	1,065	1,065	1,081
Low-temperature [4]	110	110	110	110	110
Portugal	42	41	37	44	37
Saar, low-temperature	128	140	138	125	112
Spain	276	289	280	297	305
Sweden	771	801	736	697	680
Switzerland	524	564	561	505	331
United Kingdom:					
Great Britain	14,269	14,230	13,457	12,478	11,182
Northern Ireland	183	179	129	[4] 130	[4] 130
Yugoslavia	26	25	28	29	23
Total	44,900	45,900	44,700	43,400	41,700
Asia:					
Ceylon [4]	13	13	13	13	13
Hong Kong [6]	21	19	21	20	22
India:					
Gashouse	103	79	127	136	[4] 140
Low-temperature	1,846	1,801	1,929	2,027	[4] 1,995
Japan:					
Gashouse	2,616	2,961	3,328	3,182	3,554
Low-temperature	76	[4] 75	[4] 75	[4] 75	[4] 75
Malaya [4]	19	19	19	20	20
Taiwan:					
Gashouse	13	13	[4] 17	[4] 17	18
Low-temperature	46	51	68	[4] 70	[4] 80
Turkey:					
Gashouse	181	114	111	121	[4] 130
Low-temperature			88	89	91
Total	5,100	5,310	5,990	6,210	6,580

See footnotes at end of table.

Digitized by Google

TABLE 45.—World production of gashouse, low- and medium-temperature coke (excluding breeze), 1955–59, by countries, in thousand net tons[1]—Continued

Country[2]	1955	1956	1957	1958	1959
Africa:					
Algeria	93	97	101	97	[4] 95
Tunisia	1				
Union of South Africa	88	94	97	93	82
United Arab Republic (Egypt)	25	[4] 25	[4] 25	[4] 25	[4] 25
Total	207	216	223	215	[4] 200
Oceania:					
Australia[7]	1,232	1,121	1,033	931	[4] 940
New Zealand	78	83	78	79	[4] 80
Total	1,310	1,204	1,111	1,010	1,020
World total	52,039	53,195	52,486	51,308	49,960

[1] Gashouse coke unless otherwise specified. Includes revisions of data published previously. Data do not add to totals shown owing to rounding.
[2] Production data for China, Mexico, Rumania, and U.S.S.R. are not available; estimates included in total.
[3] Concealed to avoid disclosing individual country figures; production included in total.
[4] Estimated.
[5] Data reported previously represented commercially disposable production.
[6] Includes breeze.
[7] Year ended June 30 of year stated.

COAL-CHEMICAL MATERIALS

GENERAL SUMMARY

High-temperature carbonization is the principal source of coal chemicals in the United States. Considerable research and development work on various low-temperature carbonization processes has been undertaken during the past four decades, but few processes have proved economically profitable. In 1959, only two low-temperature carbonization plants were active, and their output of coal-chemical materials was insignificant. Production of coal chemicals by coal hydrogenation or gasification is not economically feasible at present and there are no commercial plants in operation.

Coal chemicals, which have many and varied uses, are important to the organic-chemical industry. Coal carbonization was for many years the principal source of raw materials for the organic-chemical industry. In recent years, particularly since World War II, new sources of supply have been developed through the processing of natural gas and crude petroleum. In 1959, it was estimated that less than one-third of the raw materials used to manufacture finished organic chemicals were derived from coal carbonization. In the high-temperature carbonization process about 75 percent by weight of the coal charged into the ovens is recovered as coke, about 17 percent as gas, and the remaining 8 percent as chemical raw materials—tar, ammonia, and crude light oil. As such a large percentage of the coal carbonized is recovered as coke, the coke industry places more emphasis on the production of high-quality metallurgical coke than on the recovery of chemicals. Moreover, the value of the products of carbonization corresponds closely to the yields, whereas the combined value of surplus gas and chemical materials amounted to over 40 percent of the value of all products during the depression years of 1932–33. These shifts in value of coke-oven products for the 30-year period, 1939–59, are shown in figure 4.

Digitized by Google

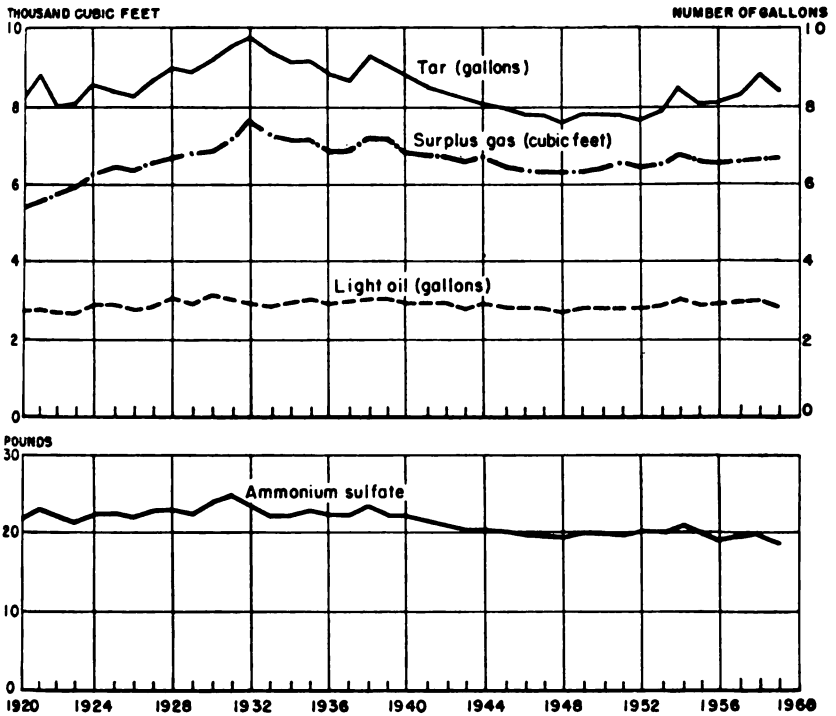

FIGURE 3.—Average yield of principal coal-chemical materials per net ton of coal carbonized in coke ovens, 1920–59. Yields of light oil and ammonium sulfate equivalent represent the average for plants recovering these products.

The value assigned to surplus gas by coke producers has changed drastically since 1929, when surplus gas represented 19 percent of the value of all products. It increased to new peaks during the depression years and reached a record of 29 percent in 1932. Since that year, however, the value of coke-oven gas has steadily decreased to only 9 percent in 1959.

The proportion of the value of all products contributed by chemical raw materials (light oil, tar, and ammonia products) reached a peak in 1916 when they represented 36 percent of the value of all products. In that year, the average prices per gallon of benzene and toluene sold by coke-plant operators were $0.624 and $2.85, respectively, and ammonium sulfate and ammonia liquor (NH_3 content) sold for $62 and $228 per ton, respectively. Prices of these products dropped steadily after World War I, and in the 1920's coal chemicals represented only about 20 percent of the value of all products. Prices of light oil, tar, and ammonia products continued to decline during the depression years, and the value of these materials during this period averaged about 15 percent of the value of all products. Although prices of some tar and light-oil products have increased since the 1930's, they have not increased as much proportionately as prices of coke and breeze, and in 1959 their value represented only 13 percent of the total.

Digitized by Google

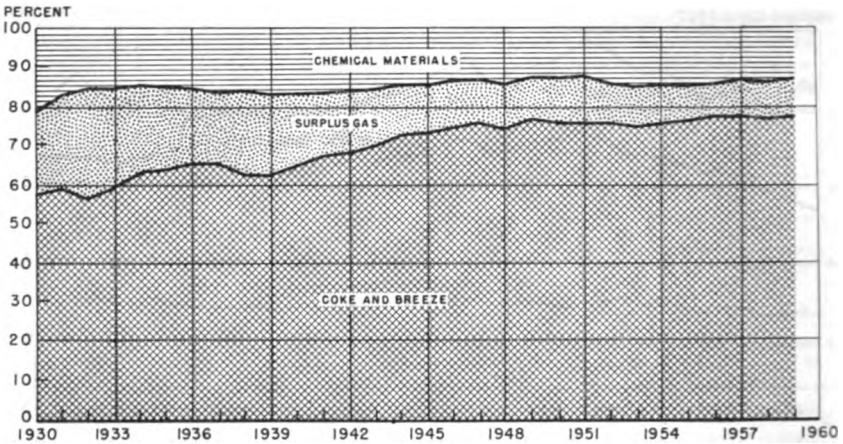

FIGURE 4.—Percentage of total value of coke-oven products from slot-type ovens supplied by coke and breeze, surplus gas, and chemical materials, 1930–59.

The average values, by product groups, of coal-chemical materials per ton of coal carbonized are shown in table 47. The values of all product groups except ammonia decreased. The slight gain for the ammonia-products group was due to the increase in sales of diammonium phosphate, which has a much higher unit value than other ammonia products. The average unit values or prices for each of the ammonia products (sulfate, liquor, and phosphates) were actually lower than in 1958.

For several years, the Bureau has compiled data showing the percentage of coal costs that may be credited to coal chemicals. These data are of interest because coal costs represent a substantial part of the cost of producing coke and coal chemicals, and relating product value to coal value provides some measure of the economic importance of these products in coal carbonization. Table 48 shows these data for 1959 and several preceding years.

The value of coal-chemical materials sold, including surplus gas used by producing companies, totaled $257,951,730, a decline of 3 percent from 1958 and 28 percent below the record established in 1957.

COKE-OVEN GAS

Production of coke-oven gas increased slightly in 1959 because more coal was charged into ovens than in 1958. The yield of gas has remained relatively constant during the past decade, averaging 10.31 thousand cubic feet per ton of coal carbonized. The yield of 10.35 thousand cubic feet in 1959 was slightly lower than the 1958 yield but was slightly higher than the 10-year average. Approximately 35 percent of the gas produced in 1959 was used for underfiring; 56 percent was used by producers as boiler fuel and in steel and allied plants; 8 percent was sold for residential, commercial, and industrial heating; and 1 percent was wasted or unaccounted for.

Table 51 shows the disposal of surplus gas, by uses and States, in 1959. Most of the gas produced at furnace oven-coke plants is used

Digitized by Google

TABLE 46.—Coal-chemical materials, exclusive of breeze, produced at coke-oven installations in the United States in 1959 [1]

Product	Produced	Sold			On hand Dec. 31
		Quantity	Value		
			Total	Average	
Tar, crude ..... gallons	653,728,164	[2] 334,716,614	$42,633,118	$0.127	31,709,151
Tar derivatives:					
Sodium phenolate ..... do	2,921,903	2,932,636	411,198	.140	274,827
Crude chemical oil ..... do	20,958,212	21,158,983	4,415,990	.209	423,590
Pitch-of-tar: [3]					
Soft ..... net tons	526,905	22,597	608,477	26.927	7,702
Medium ..... do	48,730	20,610	695,528	33.747	6,426
Hard ..... do	142,070	40,642	1,407,650	34.635	3,768
Other tar derivatives [4]	----------	----------	10,737,764	----------	----------
Ammonia:					
Sulfate [5] ..... net tons	612,738	655,446	19,457,959	29.687	98,950
Liquor (NH_3 content) ..... do	14,709	14,061	922,901	65.636	1,051
Di- and mono-ammonium phosphate ..... net tons	46,904	48,588	5,365,958	110.438	5,364
Total	----------	----------	25,746,818	----------	----------
Sulfate equivalent of all forms ..... net tons	716,703	758,575	----------	----------	----------
NH_3 equivalent of all forms ..... do	184,765	195,561	----------	----------	----------
Gas:					
Used under boilers, etc ..... M cubic feet	[6] 804,600,058	62,957,231	12,088,661	.192	----------
Used in steel or allied plants ..... do		384,536,696	90,323,508	.235	----------
Distributed through city mains ..... do		34,809,978	14,782,947	.425	----------
Sold for industrial use ..... do		32,666,619	5,928,706	.181	----------
Total	804,600,058	514,970,524	123,123,822	.239	----------
Crude light oil ..... gallons	[7] 213,036,193	19,514,987	2,992,927	.153	3,863,545
Light-oil derivatives:					
Benzene:					
Specification grades (all grades except motor) ..... gallons	119,831,005	123,489,823	35,707,371	.289	5,715,635
Motor grade ..... do	497,274	531,292	89,012	.168	31,393
Toluene (all grades) ..... do	26,963,931	26,506,642	5,465,911	.206	3,615,594
Xylene (all grades) ..... do	7,523,530	7,640,893	2,114,363	.277	740,099
Solvent naphtha (crude and refined) ..... gallons	4,023,251	3,791,371	1,011,033	.267	457,885
Other light oil derivatives ..... do	3,149,762	1,877,374	255,722	.136	166,588
Total ..... do	161,988,753	163,837,395	44,643,412	.272	10,727,194
Intermediate light oil ..... do	2,986,447	3,026,070	535,026	.177	197,705
Value of all coal-chemical materials sold	----------	----------	257,951,730	----------	----------

[1] Includes products of tar distillation conducted by coke-oven operators under same corporate name.
[2] Includes 35,073,829 gallons sold to affiliated companies for refining.
[3] Soft—water-softening point less than 110° F.; medium—from 110° to 160° F.; hard—over 160° F.
[4] Creosote oil, cresols, cresylic acid, naphthalene, phenol, pyridine, red oil, refined tar, road tar, and tar paint.
[5] Includes ammonium thiocyanate.
[6] Includes gas used for heating ovens and gas wasted.
[7] 198,380,360 gallons refined by coke-oven operators to make derived products shown.

by the producing companies, mainly in steel or allied plants. In 1959, furnace plants consumed 94 percent of their surplus gas and sold only 6 percent. Merchant plants, however, used only 24 percent of their surplus and sold the remaining 76 percent. The quantity of surplus gas distributed through city mains continued to decline and amounted to only 7 percent of the available surplus gas. In 1948, approximately 28 percent of the surplus gas was distributed through city mains for commercial and residential heating and cooking. The average value of this gas was much higher than that of gas used for other purposes. In earlier years receipts from these sales affected the value of coal chemicals. However, because so little gas was sold

Digitized by Google

TABLE 47.—Average value of coal-chemical materials used and sold and of coke and breeze produced per ton of coal carbonized in the United States, 1947–49 (average) and 1955–59

Product	1947–49 (average)	1955	1956	1957	1958	1959
Ammonia products	$0.356	$0.352	$0.315	$0.288	$0.307	$0.331
Light oil and its derivatives	[1].451	.754	.773	.749	.671	.620
Surplus gas used or sold	1.291	1.489	1.481	1.570	1.631	1.584
Tar and its derivatives (including naphthalene):						
Tar burned by producers [2]	.228	.382	.408	.447	.437	.388
Sold	.501	.717	.764	.792	.899	.776
Other products	.020	.010	.008	.010	.010	.008
Total	2.847	3.704	3.749	3.856	3.955	3.707
Coke produced	8.488	11.439	12.462	12.885	12.752	12.562
Breeze produced	.191	.237	.256	.283	.324	.329
Grand total	11.526	15.380	16.467	17.024	17.031	16.598

[1] Includes naphthalene.
[2] Includes pitch-of-tar.

TABLE 48.—Percentage of value of coal recovered by coal-chemical materials in the United States, 1947–49 (average) and 1955–59

	1947–49 (average)	1955	1956	1957	1958	1959
Product:						
Ammonia products	4.6	4.0	3.4	2.9	3.1	3.3
Light oil and its derivatives	[1]5.8	8.6	8.3	7.6	6.8	6.3
Surplus gas used or sold	16.6	16.8	15.8	15.8	16.5	16.0
Tar and its derivatives used or sold (including naphthalene)	9.3	12.4	12.5	12.5	13.5	11.8
Other products	.2	.1	.1	.1	.1	.1
Total	36.5	41.9	40.1	38.9	40.0	37.5
Value of coal per net ton	$7.79	$8.84	$9.35	$9.91	$9.89	$9.88

[1] Includes naphthalene.

TABLE 49.—Coal equivalent of the thermal materials, except coke, produced at oven-coke plants in the United States, 1913, 1918, 1929, 1939, 1947–49 (average), and 1955–59

Year	Materials produced				Estimated equivalent in heating value [1] (billion B.t.u.)					Coal equivalent (thousand net tons)
	Coke breeze (thousand net tons)	Surplus gas (billion cubic feet)	Tar (thousand gallons)	Light oil (thousand gallons)	Coke breeze	Surplus gas	Tar	Light oil	Total	
1913	735	64	115,145	3,000	14,700	35,200	17,272	390	67,562	2,600
1918	1,999	158	263,299	87,562	39,980	86,900	39,495	11,383	177,758	6,785
1929	4,853	508	680,864	200,594	97,060	279,400	102,130	26,077	504,667	19,262
1939	3,354	434	554,406	170,963	67,080	238,700	83,161	22,225	411,166	15,693
1947–49 (average)	5,390	582	715,779	246,607	107,800	320,100	107,367	32,059	567,326	21,654
1955	4,862	689	852,923	297,498	97,240	378,950	127,938	38,675	642,803	24,534
1956	4,772	664	832,827	290,972	95,436	365,200	124,924	37,826	623,386	23,793
1957	4,863	687	873,474	301,088	97,252	377,850	131,021	39,141	645,264	24,628
1958	3,656	502	669,316	218,229	73,124	276,100	100,397	28,370	477,991	18,244
1959	3,711	515	653,728	213,036	74,220	283,250	98,059	27,695	483,224	18,444

[1] Breeze, 10,000 B.t.u. per pound; gas, 550 B.t.u. per cubic foot; tar, 150,000 B.t.u. per gallon; and light oil, 130,000 B.t.u. per gallon.

Digitized by Google

for these uses in 1959, revenue from sales did not influence the value of coal-chemical materials.

Data on gases used for underfiring coke ovens are shown in table 52. Coke-oven gas comprised 79 percent of the quantity used to heat the ovens in 1959. The use of blast-furnace gas continued to increase in 1959 and comprised 17 percent of the total used for underfiring.

CRUDE COAL TAR AND DERIVATIVES

All oven-coke plants recover tar, and production depends on the rate of oven operation. Production of crude tar in 1959 declined 2 percent from 1958. This decline was due to a decrease in yield of 0.42 gallon of tar per ton of coal. Usually, when the rate of oven operation declines, tar yields increase. This was not true in 1959, as yields declined in all but two producing States. The yield of tar varies widely among coke plants, depending on the rank and grade of coal carbonized, oven temperature, completeness of recovery, and other factors. Yield of tar in 1959 ranged from 4.5 to 11.5 gallons per ton of coal. The highest yield was in the Far Western States of California, Colorado, and Utah. The lowest yields were in Connecticut, Missouri, and Wisconsin, principally because a substantial part of the coke production in these States was foundry coke, and the use of low-volatile coal and anthracite reduced tar yields.

Crude coal tar may be used as a fuel or processed to make various tar products. Table 53 shows in detail, by States, the production

TABLE 50.—Production and disposal of coke-oven gas in the United States in 1959, by States, in thousand cubic feet

State	Produced		Used in heating ovens	Surplus used or sold			Wasted
	Total	Per ton of coal coked		Quantity	Value		
					Total	Average	
Alabama	65,373,875	9.72	32,055,070	31,737,048	$4,188,612	$0.132	1,581,757
California, Colorado, and Utah	42,722,836	11.46	13,051,780	29,367,988	5,424,045	.185	303,068
Illinois	30,129,402	10.10	7,473,269	21,915,798	4,437,278	.202	740,335
Indiana	98,184,006	10.25	31,884,153	65,800,209	17,950,155	.273	499,644
Kentucky, Tennessee, and Texas	24,511,956	9.99	10,712,264	11,559,630	1,588,459	.137	2,240,062
Maryland	35,042,870	11.05	7,264,691	27,548,680	(1)	(1)	229,499
Massachusetts	4,985,983	10.11	1,275,948	3,710,035	(1)	(1)	----------
Michigan	44,077,465	9.96	5,891,181	38,076,125	8,703,876	.229	110,159
Minnesota	11,041,382	11.06	4,208,159	6,696,713	2,174,919	.325	136,510
New Jersey	9,096,500	10.76	2,562,003	6,534,497	(1)	(1)	----------
New York	41,963,456	9.59	12,865,282	28,940,219	9,246,715	.320	157,955
Ohio	125,375,590	10.07	49,520,543	73,682,728	17,979,878	.244	2,172,319
Pennsylvania	210,127,095	10.57	81,566,715	126,692,134	26,485,143	.209	1,868,246
West Virginia	50,036,155	11.24	14,515,428	35,012,435	7,776,612	.222	508,292
Connecticut, Missouri, and Wisconsin	11,931,487	10.25	4,235,202	7,696,285	4,328,616	.562	----------
Undistributed	----------	----------	----------	----------	12,838,614	.340	----------
Total 1959	804,600,058	10.35	279,081,688	514,970,524	123,123,822	.239	10,547,846
At merchant plants	93,046,701	9.72	36,627,765	55,643,619	17,261,795	.310	775,317
At furnace plants	711,553,357	10.44	242,453,923	459,326,905	105,862,027	.230	9,772,529
Total 1958	789,828,396	10.42	274,748,210	501,999,472	123,641,184	.246	13,080,714

[1] Included with "Undistributed" to avoid disclosing individual company figures.

Digitized by Google

TABLE 51.—Surplus coke-oven gas used by producers and sold in the United States in 1959, by States, in thousand cubic feet

State	Used by producers—					
	Under boilers, etc.			In steel or allied plants		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	11,433,425	$1,497,743	$0.131	16,287,236	$2,221,678	$0.136
California, Colorado, and Utah				28,120,307	5,274,100	.188
Illinois	2,356,427	(1)	(1)	19,539,683	4,192,991	.215
Indiana	6,399,090	1,781,798	.278	48,201,750	12,667,026	.263
Kentucky, Tennessee, and Texas	5,436,089	607,484	.112	50,348	(1)	(1)
Maryland				27,548,680	(1)	(1)
Massachusetts	115,629	(1)	(1)	1,222	(1)	(1)
Michigan	3,710,448	(1)	(1)	32,396,059	7,188,324	.222
Minnesota	1,469,232	358,393	.244	2,224,948	(1)	(1)
New Jersey						
New York	3,894,258	(1)	(1)	19,628,028	(1)	(1)
Ohio	9,461,884	2,241,986	.237	54,004,035	13,994,973	.259
Pennsylvania	16,459,115	2,743,821	.167	103,929,606	22,008,813	.212
West Virginia	812,588	(1)	(1)	32,604,794	7,454,628	.229
Connecticut, Missouri, and Wisconsin	1,409,046	262,157	.186			
Undistributed		2,595,279	.238		15,320,975	.310
Total 1959	62,957,231	12,088,661	.192	384,536,696	90,323,508	.235
At merchant plants	10,430,243	2,156,390	.207	3,102,515	674,445	.217
At furnace plants	52,526,988	9,932,271	.189	381,434,181	89,649,063	.235
Total 1958	61,444,918	11,979,000	.195	374,467,823	88,643,743	.237

State	Sold					
	Distributed through city mains			For industrial use		
	Quantity	Value		Quantity	Value	
		Total	Average		Total	Average
Alabama	903,450	(1)	(1)	3,112,937	(1)	(1)
California, Colorado, and Utah				1,247,681	$150,845	$0.121
Illinois				19,688	(1)	(1)
Indiana	3,269,483	(1)	(1)	7,929,886	(1)	(1)
Kentucky, Tennessee, and Texas				6,073,193	(1)	(1)
Maryland						
Massachusetts	3,593,184	(1)	(1)			
Michigan				1,969,618	(1)	(1)
Minnesota	2,087,274	(1)	(1)	915,259	(1)	(1)
New Jersey	6,534,497	(1)	(1)			
New York	5,235,624	(1)	(1)	182,309	(1)	(1)
Ohio				10,216,809	1,742,919	.171
Pennsylvania	6,303,413	$1,732,509	$0.275			
West Virginia	1,595,053	(1)	(1)			
Connecticut, Missouri, and Wisconsin	5,288,000	3,886,680	.735	999,239	179,779	.180
Undistributed		9,163,758	.395		3,855,163	.191
Total 1959	34,809,978	14,782,947	.425	32,666,619	5,928,706	.181
At merchant plants	24,666,121	11,279,166	.457	17,444,740	3,151,794	.181
At furnace plants	10,143,857	3,503,781	.345	15,221,879	2,776,912	.182
Total 1958	[2]37,741,179	[2]17,707,095	[2].469	[2]28,345,552	[2]5,311,346	[2].187

[1] Included with "Undistributed" to avoid disclosing individual company figures.
[2] Revised figure.

Digitized by Google

TABLE 52.—Coke-oven gas and other gases used in heating coke ovens in the United States in 1959, by States, in thousand cubic feet[1]

State	Coke-oven gas	Producer gas	Blue-water gas	Blast-furnace gas	Natural gas	Other gases[2]	Total coke-oven gas equivalent
Alabama	32,055,070				290,977		32,346,047
California, Colorado, and Utah	13,051,780			6,003,535	531,875		19,587,190
Illinois	7,473,269			5,917,831		1,284	13,392,384
Indiana	31,884,153			8,991,634	3,036,821		43,912,608
Kentucky, Tennessee, and Texas	10,712,264						10,712,264
Maryland	7,264,691			7,719,818			14,984,509
Massachusetts	1,275,948				852,960		2,128,908
Michigan	5,891,181			13,820,180	314,266		20,025,627
Minnesota	4,208,159	191,318	160,414			187,529	4,747,420
New Jersey	2,562,003	1,300,000			456,650		4,318,653
New York	12,865,282			5,529,118	947,842		19,342,242
Ohio	49,520,543			3,595,098	356,218		53,471,859
Pennsylvania	81,566,715	479,437		2,384,469	5,305,304	385	89,736,310
West Virginia	14,515,428			5,846,821		76,646	20,438,895
Connecticut, Missouri, and Wisconsin	4,235,202	1,367,000			478,000		6,080,202
Total 1959	279,081,688	3,337,755	160,414	59,808,504	12,570,913	265,844	355,225,118
At merchant plants	36,627,765	3,337,755			3,868,756	77,031	43,911,307
At furnace plants	242,453,923		160,414	59,808,504	8,702,157	188,813	311,313,811
Total 1958	274,748,210	4,395,894	296,112	52,974,699	6,663,139	1,703,062	340,781,116

[1] Adjusted to an equivalent of 550 B.t.u. per cubic foot.
[2] Liquefied petroleum, propane, refinery gas, and hydrogen-free coke-oven gas (spillage gas).

and disposal of crude tar. As a rule, small coke plants cannot construct and operate distilling plants profitably. These plants generally sell their entire output to tar distillers. The larger coke plants usually are associated with iron and steel works and can burn, sell, or distill the crude tar, depending on the economics involved. In 1959, furnace plants refined or topped 35 percent of their production, burned 19 percent, and sold 46 percent to tar distillers for refining.

Tar may be completely refined or partially refined (topped). In the coke industry, about 67 percent of the tar processed by the producers is topped. The producing companies sell the fraction removed by topping, known as crude chemical oil or tar acid oil, and retain the resulting topped tar or pitch for use as a metallurgical fuel. In the past few years, more attention has been given to the production of special types of pitches, and commercial sales in 1959 amounted to 83,849 tons valued at $2,711,655. Other tar derivatives produced at coke plants include creosote oil, naphthalene, phenol, cresols, and cresylic acid. However, statistics on these products cannot be shown, as there are less than three companies making the various products and publication of production data would reveal individual company figures.

COKE-OVEN AMMONIA

The statistics in this chapter include only ammonia recovered from the distillation or carbonization of coal and do not include ammonia produced synthetically from coke-oven gas. Coke-oven ammonia is recovered in two forms: (1) As an aqueous solution known as ammonia liquor and (2) as a crystalline solid, such as ammonium sulfate and di- and mono-ammonium phosphate. The yield of ammonia has remained relatively stable for many years and averaged 18.70 pounds

Digitized by Google

TABLE 53.—Coke-oven tar produced, used by producers, and sold in the United States in 1959, by States, in gallons

State	Produced		Used by producers—		
	Total	Per ton of coal coked	For refining or topping	As fuel	Otherwise
Alabama	50,415,966	7.49	11,077,020	2,030,137	47,785
California, Colorado, and Utah	37,719,737	10.12	5,347,929	15,508,854	12,123
Illinois	22,029,487	7.38			
Indiana	67,454,359	7.04	28,141,276	3,498,569	
Kentucky, Tennessee, and Texas	17,434,031	7.10			99,896
Maryland	28,881,511	9.10		28,122,232	
Massachusetts	4,208,004	8.53			
Michigan	33,549,388	7.58			127,143
Minnesota	7,932,759	7.94			6,400
New Jersey	7,040,840	8.33			
New York	35,605,731	8.14	19,623,768		6,650
Ohio	98,582,346	7.92	11,816,629	16,134,463	169,369
Pennsylvania	190,713,559	9.59	108,804,091	34,291,081	1,067,656
West Virginia	44,953,339	10.10	20,985,969	9,861,764	
Connecticut, Missouri, and Wisconsin	7,207,107	6.19			
Undistributed					
Total 1959	653,728,164	8.41	205,796,682	109,447,100	1,537,022
At merchant plants	67,317,094	7.04	960,408		
At furnace plants	586,411,070	8.60	204,836,274	109,447,100	1,537,022
Total 1958	669,316,299	8.83	228,044,385	99,702,595	3,786,249

State	Sold for refining into tar products [1]			On hand Dec. 31
	Quantity	Value		
		Total	Average	
Alabama	37,811,034	$5,099,497	$0.135	2,430,312
California, Colorado, and Utah	17,302,511	2,285,370	.132	1,292,551
Illinois	21,892,132	2,799,643	.128	600,830
Indiana	35,947,682	4,663,755	.130	2,642,674
Kentucky, Tennessee, and Texas	17,190,595	2,216,900	.129	220,197
Maryland	156,907	[2]	[2]	2,426,705
Massachusetts	4,242,881	[2]	[2]	114,972
Michigan	34,183,125	4,325,603	.127	1,978,589
Minnesota	8,228,944	1,043,363	.127	570,539
New Jersey	7,611,019	[2]	[2]	113,000
New York	15,401,313	1,952,043	.127	2,082,000
Ohio	71,008,426	8,596,817	.121	3,832,991
Pennsylvania	42,118,261	5,268,559	.125	11,868,799
West Virginia	14,598,893	1,951,458	.134	588,535
Connecticut, Missouri, and Wisconsin	7,022,891	904,253	.129	946,477
Undistributed		1,525,857	.127	
Total 1959	334,716,614	42,633,118	.127	31,709,151
At merchant plants	67,078,315	8,720,256	.130	2,291,532
At furnace plants	267,638,299	33,912,862	.127	29,417,619
Total 1958	347,420,362	46,231,212	.133	30,913,068

[1] Comprises 35,073,829 gallons valued at $4,608,915 sold to affiliated companies and 299,642,785 gallons valued at $38,024,203 sold to other purchasers.
[2] Included with "Undistributed" to avoid disclosing individual company figures.

per ton of coal in 1959. With the exception of one plant that made ammonium thiocyanate, only two products were made at coke plants until the 1950's; about 85 percent of the ammonia was converted into ammonium sulfate, and the remainder was recovered and marketed as ammonia liquor. In the early 1950's, diammonium phosphate was made commercially for the first time at a coke plant. Soon thereafter, two other plants started to make this fertilizer material. In 1959, 55 plants made sulfate; 11 plants, ammonia liquor; 3 plants,

Digitized by Google

diammonium phosphate; 1 plant, monoammonium phosphate; and 1 plant, ammonium thiocyanate. Of the ammonia recovered from coal in 1959, 85 percent was converted into ammonium sulfate, 8 percent was recovered as ammonia liquor, and 7 percent was made into di- and mono-ammonium phosphate.

Production of coke-oven ammonium sulfate increased from about 650,000 tons just before World War II to a peak of 946,000 tons in

TABLE 54.—Coke-oven ammonia produced and sold in the United States in 1959, by States, in net tons

State	Active plants [1]	Produced			
		Sulfate equivalent	Pounds per ton of coal coked	As sulfate [2]	As liquor (NH_3 content)
Alabama	7	72,857	21.66	71,732	290
California, Colorado, and Utah [3]	4	38,431	20.61	38,431	
Illinois	5	30,645	21.29	30,645	
Indiana	5	66,324	13.85	57,087	2,381
Kentucky, Tennessee, and Texas	3	20,469	19.37	7,718	3,287
Maryland	1	27,161	17.12	27,161	
Massachusetts [4]	1	4,487	18.19	4,487	
Michigan [3]	4	38,883	17.57	29,054	2,534
Minnesota	2	7,087	18.15	7,087	
New Jersey [5]	2	11,073	26.20	11,073	
New York	3	47,848	21.88	40,125	1,991
Ohio	14	106,071	17.05	92,103	3,600
Pennsylvania	13	194,683	19.66	194,683	
West Virginia	3	43,440	19.64	43,440	
Connecticut and Wisconsin	2	7,244	16.53	4,816	626
Undistributed					
Total 1959	69	716,703	18.70	659,642	14,709
At merchant plants	16	90,551	20.46	42,801	12,309
At furnace plants	53	626,152	18.47	616,841	2,400
Total 1958	73	739,240	19.86	681,433	14,902

State	Sold				On hand Dec. 31	
	As sulfate [2]		As liquor (NH_3 content)		Sulfate [2]	Liquor (NH_3 content)
	Quantity	Value	Quantity	Value		
Alabama	76,224	$2,505,889	286	(6)	11,319	31
California, Colorado, and Utah [3]	45,293	3,478,746			9,564	
Illinois	29,973	933,569			2,572	
Indiana	63,857	2,012,054	2,803	(6)	11,369	111
Kentucky, Tennessee, and Texas	7,101	(6)	3,391	(6)	845	188
Maryland	26,501	(6)			4,857	
Massachusetts [4]	4,690	(6)			68	
Michigan [3]	29,843	(6)	1,642	(6)	4,259	67
Minnesota	6,882	223,214			800	
New Jersey [5]	11,142	(6)			528	
New York	40,121	(6)	2,045	(6)	5,168	29
Ohio	92,419	2,821,996	3,228	(6)	12,113	573
Pennsylvania	222,531	5,916,418			36,092	
West Virginia	42,921	1,173,209			4,474	
Connecticut and Wisconsin	4,536	(6)	666	(6)	286	52
Undistributed		5,758,822		$922,901		
Total 1959	704,034	24,823,917	14,061	922,901	104,314	1,051
At merchant plants	43,973	2,177,273	11,284	781,555	1,564	916
At furnace plants	660,061	22,646,644	2,777	141,346	102,750	135
Total 1958	659,652	22,404,350	13,232	881,873	149,557	1,795

[1] Number of plants that recovered ammonia.
[2] Includes di- and mono-ammonium phosphate and ammonium thiocyanate.
[3] Figures include diammonium phosphate.
[4] Figures include ammonium thiocyanate.
[5] Figures include monoammonium phosphate.
[6] Included with "Undistributed" to avoid disclosing individual company figures.

Digitized by Google

1957. Synthetic ammonia plants did not make ammonium sulfate until after the end of World War II, and not until 1949 did production of synthetic ammonium sulfate exceed that of coke-oven ammonium sulfate. Production of synthetic ammonium sulfate increased rapidly and in 1959 amounted to 65 percent of the U.S. output of ammonium sulfate. Production of ammonium sulfate (including phosphate) at coke plants in 1959 decreased 3 percent, and output of ammonia liquor dropped 1 percent. Statistics showing production and sales of ammonia products, by States, are shown in table 54.

CRUDE LIGHT OIL AND DERIVATIVES

Crude light oil was recovered at all but six of the active oven-coke plants in 1959. The yield of crude light oil dropped 0.14 gallon per ton of coal carbonized, and this decrease resulted in a 2-percent decline in production. Although crude coal tar contains a small percentage of light oil, only an insignificant quantity came from this source, as virtually all light oil was obtained by scrubbing it from the gas stream. In the early days of the industry, the practice was to include as light oil all materials distilling to 200° C. In modern light-oil refining plants, only material having a distillation limit of 150° to 155° C. is classified as light oil, and a secondary fraction distilling between 150° and 200° C. (known as intermediate light oil) is separated. Table 55 shows production and yield of crude light oil, by States.

Crude light oil is generally refined by producers, and only about 5 percent is sold to commercial tar distillers. In refining crude light oil, about 60 to 65 percent is recovered as benzene, 12 to 14 percent as toluene, 3 to 4 percent as xylene, and 2 to 3 percent as solvent naphtha; 2 to 3 percent is made into other salable products. (See table 56.)

Virtually all benzene produced at coke plants is made to meet established specifications and is used in the chemical industry (table 57). Until recent years almost all of the benzene produced in the United States was derived from coal. Production of benzene from petroleum fractions was begun in the early 1950's when the supply from coal carbonization and imports could not meet requirements. Output from this source increased steadily and exceeded coke-oven benzene for the first time in 1958. In 1959, coke-oven benzene was only about 37 percent of the national output, exclusive of imports. Table 59 shows the production of benzene by coke-plant operators, tar distillers, and petroleum refiners.

Annual imports, 1955–59, have averaged over 52 million gallons. Most of these imports originated in the Soviet-bloc countries (U.S.S.R., Poland, and Czechoslovakia). A major part of the benzene imported from these countries is a specification or pure grade that is used by consumers without further processing. This pure benzene is not included in the statistics published by the U.S. Tariff Commission on benzene production by tar distillers. These statistics include only benzene made by refining or upgrading imported crude benzene or light oil. Although the Tariff Commission data are accurate and represent all commercial benzene produced in the United States, they

Digitized by Google

TABLE 55.—Coke-oven crude light oil produced in the United States and derived products produced and sold in 1959, by States, in gallons

State	Active plants [1]	Crude light oil				Derived products		
		Produced	Per ton of coal coked	Refined on premises [2]	On hand Dec. 31	Produced	Sold [3]	
							Quantity	Value
Alabama	7	16,582,823	2.46	15,815,703	438,258	12,101,775	12,171,139	$3,423,021
California, Colorado, and Utah	4	12,267,315	3.29	12,246,056	182,753	10,368,702	10,461,539	2,624,657
Illinois	5	8,924,188	3.10	6,525,249	144,271	5,349,816	5,318,253	1,386,753
Indiana	4	24,101,676	2.67	24,078,389	189,947	17,864,078	14,821,983	3,896,986
Kentucky, Tennessee, and Texas	4	6,596,152	2.69	3,019,411	114,519	2,594,373	2,533,375	651,500
Maryland	1	11,138,112	3.51	11,161,104	129,265	9,665,488	9,624,674	(4)
Massachusetts	1	1,178,920	2.39	2,371,474	43,774	1,934,981	2,236,198	(4)
Michigan	4	12,135,619	2.74	5,870,257	256,350	4,753,942	4,780,120	(4)
New Jersey	1	1,876,645	2.59		8,240			
New York	3	13,563,579	3.10	18,508,303	439,643	15,705,682	16,006,116	4,485,667
Ohio	14	32,058,412	2.58	28,960,001	523,487	23,338,745	24,459,696	6,615,837
Pennsylvania	14	57,744,992	2.90	56,049,588	1,282,587	46,300,008	49,080,555	13,783,091
West Virginia	4	12,421,578	2.79	12,428,179	39,162	10,811,334	11,163,704	2,883,658
Connecticut, Missouri, and Wisconsin	3	2,446,182	2.10	1,346,646	71,289	1,199,829	1,180,043	293,962
Undistributed								4,598,280
Total 1959	69	213,036,193	2.81	198,380,360	3,863,545	161,988,753	163,837,395	44,643,412
At merchant plants	17	20,735,026	2.42	14,735,123	882,866	12,223,436	12,683,045	3,329,458
At furnace plants	52	192,301,167	2.85	183,645,237	2,980,679	149,765,317	151,154,350	41,313,954
Total 1958	70	218,229,276	2.95	203,318,636	4,893,451	165,222,732	163,288,973	47,370,524

[1] Number of plants that recovered crude light oil.
[2] Includes small quantity of material also reported in sales of crude light oil in table 46.
[3] Excludes 19,514,987 gallons of crude light oil, valued at $2,992,927, sold as such.
[4] Included with "Undistributed" to avoid disclosing individual company figures.

do not represent the total available supply. In an attempt to determine the supply of benzene in the United States, table 60 has been prepared based upon data previously published by various Government agencies.

Benzene is used in the chemical industry to manufacture a host of chemical end products. In recent years the Chemical Committee of

TABLE 56.—Yield of light-oil products from refining crude light oil at oven-coke plants in the United States, 1929, 1939, 1947–49 (average), and 1955–59, in percent

Year	Benzene		Toluene (all grades)	Xylene (all grades)	Solvent naphtha (crude and refined)	Other light-oil products
	Motor	All other grades				
1929	54.4	12.8	9.4	(1)	3.7	3.4
1939	48.6	15.4	12.1	2.5	2.9	3.8
1947–49 (average)	6.5	59.2	11.7	3.1	2.3	3.3
1955	(2)	62.0	13.6	4.0	2.0	2.3
1956	(2)	63.0	13.5	3.7	2.1	2.3
1957	.6	61.9	13.1	3.7	2.2	2.8
1958	.7	58.2	13.8	4.1	2.2	2.3
1959	.3	60.4	13.6	3.8	2.0	1.6

[1] Included with "Solvent naphtha (crude and refined)."
[2] Included with "Other light-oil products" to avoid disclosing individual company figures.

Digitized by Google

TABLE 57.—Light-oil derivatives produced and sold at oven-coke plants in the United States in 1959, by States, in gallons

State	Benzene (all grades except motor)				Toluene (all grades)			
	Produced	Yield from crude light oil refined (percent)	Sold		Produced	Yield from crude light oil refined (percent)	Sold	
			Quantity	Value			Quantity	Value
Alabama	9,128,505	57.7	9,276,215	$2,781,354	2,158,525	12.6	2,062,576	$419,429
California, Colorado, and Utah	6,940,477	56.7	7,604,909	1,968,873	1,846,470	15.1	1,683,481	356,817
Illinois	4,253,788	65.2	4,207,978	1,162,346	767,667	11.8	784,449	167,138
Indiana	14,703,242	61.1	12,170,797	3,326,169	2,225,044	9.2	1,645,350	330,382
Maryland	7,694,644	68.9	7,589,181	(1)	1,562,128	14.0	1,613,380	(1)
Massachusetts	1,445,744	61.0	1,735,861	(1)	365,704	15.4	379,018	(1)
Michigan and Wisconsin	4,204,344	62.0	4,188,000	1,223,758	864,646	12.8	892,072	197,720
New York	11,804,571	63.8	12,219,998	3,647,430	2,563,302	13.8	2,506,796	537,604
Ohio	17,274,178	59.6	18,831,454	5,383,163	3,682,953	12.7	3,695,329	775,279
Pennsylvania	32,485,846	58.0	35,360,039	10,610,685	8,328,197	14.9	8,716,868	1,776,310
West Virginia	7,501,918	60.4	7,926,596	2,250,540	2,228,793	17.9	2,157,627	403,524
Missouri, Tennessee, and Texas	2,393,748	69.2	2,378,795	(1)	870,502	10.7	869,696	(1)
Undistributed				3,353,553				501,708
Total 1959	119,831,005	60.4	123,489,823	35,707,371	26,963,931	13.6	26,506,642	5,465,911
At merchant plants	8,398,368	57.0	8,798,234	2,511,309	2,194,460	14.9	2,251,974	489,698
At furnace plants	111,432,637	60.7	114,691,589	33,196,062	24,769,471	13.5	24,254,668	4,976,213
Total 1958	118,279,684	58.2	118,739,548	36,985,209	28,072,423	13.8	28,568,935	6,310,470

State	Xylene (all grades)				Solvent naphtha (crude and refined)			
	Produced	Yield from crude light oil refined (percent)	Sold		Produced	Yield from crude light oil refined (percent)	Sold	
			Quantity	Value			Quantity	Value
Alabama	542,069	3.4	593,967	$168,541	177,963	1.1	138,194	$39,799
California, Colorado, and Utah	442,906	3.6	469,028	122,607	494,263	4.0	490,345	127,691
Illinois	161,725	2.5	166,190	44,782	38,732	.6	31,732	8,296
Indiana	227,832	.9	277,023	74,815	613,624	2.5	554,481	137,614
Maryland	408,716	3.7	422,113	(1)				
Massachusetts	80,566	3.4	80,749	(1)	42,967	1.8	40,570	(1)
Michigan and Wisconsin	230,303	3.4	241,052	63,499	1,705	(2)	275	(1)
New York	608,923	3.3	545,248	182,771	66,525	.4	70,999	(1)
Ohio	1,336,206	4.6	1,297,929	297,554	600,159	2.1	593,099	154,989
Pennsylvania	2,659,359	4.7	2,756,284	833,290	1,784,331	3.2	1,666,123	479,663
West Virginia	727,721	5.9	717,491	171,523	136,397	1.1	145,485	25,814
Missouri, Tennessee, and Texas	97,204	2.8	78,819	(1)	66,585	1.9	60,068	(1)
Undistributed				154,961				37,267
Total 1959	7,523,530	3.8	7,640,893	2,114,363	4,023,251	2.0	3,791,371	1,011,033
At merchant plants	584,130	4.0	604,853	186,706	95,782	.7	100,446	18,914
At furnace plants	6,939,400	3.8	7,036,040	1,927,657	3,927,469	2.1	3,690,925	992,119
Total 1958	8,408,431	4.1	8,266,490	2,403,150	4,419,272	2.2	4,263,431	1,149,352

[1] Included with "Undistributed" to avoid disclosing individual company figures.
[2] Less tha 0.05 percent.

the American Coke and Coal Chemicals Institute has prepared annual estimates on consumption of benzene by uses. Table 61 shows these estimates for 1959 and earlier years.

Production of toluene and xylene from coal in 1959 comprised only 19 and 9 percent, respectively, of the U.S. production. The bulk of these aromatic chemicals was obtained from petroleum.

Digitized by Google

TABLE 58.—Benzene and toluene produced at oven-coke plants in the United States, 1941, 1947–49 (average), and 1955–59, by grades, in gallons

Year	Benzene				Toluene		
	Motor	Nitration or 1° C.	Industrial pure or 2° C.	All other	Nitration or 1° C.	Industrial pure or 2° C.	All other
1941	106,372,000	15,414,500	18,286,400	4,182,600	14,689,800	13,268,500	1,378,900
1947–49 (average)	15,246,900	38,335,100	98,395,100	2,535,900	21,407,400	5,529,200	568,600
1955	(1)	87,642,000	84,125,700	2,452,600	30,037,900	8,167,500	(2)
1956	(1)	74,312,800	97,393,000	2,720,200	29,673,600	7,564,500	(2)
1957	1,834,300	88,262,900	79,421,900	11,567,500	30,716,800	7,268,300	(2)
1958	1,389,800	77,427,100	38,679,200	2,173,400	22,554,600	5,517,800	(2)
1959	497,300	85,955,000	32,036,100	1,839,900	21,160,700	4,787,900	1,015,300

[1] Withheld to avoid disclosing individual company figures.
[2] Included with "Industrial pure or 2° C." to avoid disclosing individual company figures.

TABLE 59.—Production of benzene (excluding Motor grade) in the United States, 1947–49 (average) and 1955–59, in thousand gallons [1]

Year	From tar distilleries [2]					From coke-oven operations				
	Produced	Percent of total	Sold			Produced	Percent of total	Sold		
			Quantity	Value				Quantity	Value	
				Total	Average				Total	Average
1947–49 (average)	15,434	10.0	7,288	$1,505	$0.21	139,266	90.0	137,671	$25,413	$0.19
1955	34,671	11.3	24,948	7,970	.32	174,220	56.6	168,750	58,663	.35
1956	50,551	15.0	34,698	10,377	.30	174,426	51.8	173,420	59,548	.34
1957	36,112	10.9	24,787	8,911	.36	179,252	54.1	171,944	59,080	.34
1958	26,781	9.3	17,000	7,525	.44	118,280	41.2	118,740	36,985	.31
1959	[3] 18,498	5.6	(4)	(4)	(4)	119,831	36.3	123,490	35,707	.29

Year	From petroleum refineries					Total				
	Produced	Percent of total	Sold			Produced	Percent of total	Sold		
			Quantity	Value				Quantity	Value	
				Total	Average				Total	Average
1947–49 (average)	(5)	(5)	(5)	(5)	(5)	154,700	100.0	144,959	$26,918	$0.19
1955	98,588	32.1	71,110	$30,901	$0.43	307,479	100.0	264,808	97,534	.37
1956	111,613	33.2	76,331	32,834	.43	336,590	100.0	284,449	102,759	.36
1957	116,184	35.0	79,773	29,991	.38	331,548	100.0	276,504	97,982	.35
1958	142,109	49.5	107,568	34,812	.32	287,170	100.0	243,308	79,322	.33
1959	[3] 191,532	58.1	(4)	(4)	(4)	[3] 329,861	100.0	(4)	(4)	(4)

[1] U.S. Tariff Commission.
[2] Includes benzene made from imported crude light oil.
[3] Preliminary figure.
[4] Not available.
[5] Small quantity included in "From tar distilleries."

Digitized by Google

TABLE 60.—Estimated supply of specification grades of benzene (excluding Motor grade) in the United States, 1950–59, in thousand gallons

	1950	1951	1952	1953	1954
Production from domestic crude material:					
By coke ovens [1]	154,466	172,849	155,114	177,593	139,438
By tar distillers [2]	15,500	19,000	19,000	19,000	15,000
By petroleum refiners [3]	10,129	32,572	35,518	63,043	91,912
Total	180,095	224,421	209,632	259,636	246,350
Imports (pure benzene equivalent) [4]	22,126	65,113	41,534	19,561	11,875
Total supply	202,221	289,534	251,166	279,197	258,225

	1955	1956	1957	1958	1959
Production from domestic crude material:					
By coke ovens [1]	174,220	174,426	179,252	118,280	119,831
By tar distillers [2]	15,000	15,000	13,000	9,000	10,000
By petroleum refiners [3]	98,588	111,613	116,184	142,109	191,532
Total	287,808	301,039	308,436	269,389	321,363
Imports (pure benzene equivalent) [4]	30,476	66,063	52,557	42,318	54,469
Total supply	318,284	367,102	360,993	311,707	375,832

[1] Federal Bureau of Mines
[2] Estimated.
[3] U.S. Tariff Commission.
[4] Official import statistics published by the Bureau of the Census, U.S. Department of Commerce, do not differentiate between crude and pure benzene. Pure benzene equivalent of imports estimated at 95 percent.

TABLE 61.—Estimated consumption of commercial benzene (excluding Motor grade) in the United States, 1957–60, by uses, in thousand gallons [1]

Use	1957	1958	1959	1960
Styrene	142,000	149,000	186,000	195,000
Phenol (synthetic)	70,000	64,000	86,000	93,000
Detergents (synthetic)	34,000	37,000	35,000	36,000
Fibers (synthetic)	30,000	30,000	30,000	40,000
Aniline	14,000	12,000	16,000	17,000
DDT	12,000	14,000	15,000	15,000
Di- and mono-chlorobenzene	9,000	8,000	9,000	10,000
Maleic anhydride	7,000	7,500	8,000	12,000
Benzene hexachloride	3,500	2,500	1,500	1,500
Diphenyls	4,500	4,500	4,500	4,500
Nitrobenzene	2,000	2,000	2,000	2,000
Miscellaneous	20,000	20,000	25,000	25,000
Export	3,000	11,500	7,000	15,000
Total	351,000	362,000	425,000	466,000

[1] Coal-Chemicals Committee, American Coke and Coal-Chemicals Institute, Washington, D.C.

Digitized by Google

COKE OVENS OWNED BY CITY GAS COMPANIES

(PUBLIC UTILITIES)

Table 62 contains a comparison of coke and coal-chemical materials produced in 1959 by gas utilities with those produced by plants that are not owned by gas utilities. This tabulation will be discontinued because the closing in 1959 of the Camden, N.J., coke plant by the Public Service Electric and Gas Co. left only two active plants owned by city gas companies. The use of coke ovens by gas utilities has decreased sharply in recent years because the gas utilities have substituted the distribution of natural gas for coke-oven gas. The production of coke and coal chemicals by gas utilities reached a peak in the 1930's when gas utilities supplied approximately 10 percent of the oven-coke, tar, and coke-oven gas produced in the United States. In 1959, city gas plants produced less than 1 percent of these materials.

Digitized by Google

TABLE 62.—Coke, breeze, and coal-chemical materials produced in the United States at oven-coke plants owned by city gas companies (public utilities) [1] compared with all other oven-coke plants, 1958–59

	1958			1959		
	Plants not owned by city gas companies	Plants owned by city gas companies (public utilities)	Total	Plants not owned by city companies	Plants owned by city gas companies (public utilities)	Total
Number of active plants	74	3	77	72	3	75
Coke:						
Produced net tons	52,394,502	611,228	53,005,730	54,242,837	546,439	54,789,276
Value	$953,268,003	$13,526,535	$966,794,538	$963,685,293	$12,658,593	$976,343,886
Average per ton	$18.19	$22.13	$18.24	$17.77	$23.17	$17.82
Breeze:						
Produced net tons	3,602,671	53,527	3,656,198	3,671,812	39,156	3,710,968
Sold do	865,035	953	865,988	879,131	20,825	899,956
Value of sales	$6,601,664	$8,776	$6,610,440	$7,059,644	$152,138	$7,211,782
Average per ton	$7.63	$9.21	$7.63	$8.03	$7.31	$8.01
Coal carbonized:						
Bituminous net tons	74,720,793	840,248	75,561,041	76,632,322	721,755	77,354,077
Anthracite do	225,158	29,627	254,785	333,154	35,676	368,830
Total do	74,945,951	869,875	75,815,826	76,965,476	757,431	77,722,907
Value	$739,924,845	$9,971,726	$749,896,571	$759,699,680	$8,375,974	$768,075,654
Average per ton	$9.87	$11.46	$9.89	$9.87	$11.06	$9.88
Coke:						
Used by producing companies:						
Net tons	46,039,705	75,534	46,115,239	46,673,152	54,083	46,727,235
Value	$827,980,477	$1,257,166	$829,237,643	$811,345,070	$892,419	$812,237,489
Sold commercially:						
Net tons	5,846,912	376,245	6,223,157	6,616,583	603,836	7,220,419
Value	$114,525,301	$9,117,075	$123,642,376	$136,564,236	$14,235,864	$150,800,100
Coal-chemical materials:						
Tar:						
Produced gallons	663,228,172	6,088,127	669,316,299	648,830,618	4,897,546	653,728,164
Sold do	341,448,209	5,972,153	347,420,362	329,208,869	5,507,745	334,716,614
Value of sales	$45,474,039	$757,173	$46,231,212	$41,967,070	$666,048	$42,633,118
Ammonia:						
Produced (NH_3 equivalent of all forms) net tons	188,858	1,718	190,576	183,020	1,745	184,765
Liquor (NH_3 content):						
Produced do	14,902	----------	14,902	14,709	----------	14,709
Sold do	13,232	----------	13,232	14,061	----------	14,061
Value of sales	$881,873	----------	$881,873	$922,901	----------	$922,901
Sulfate: [2]						
Produced net tons	674,768	6,665	681,433	652,872	6,770	659,642
Sold do	652,126	7,526	659,652	696,842	7,192	704,034
Value of sales	$22,167,472	$236,878	$22,404,350	$24,596,065	$227,852	$24,823,917

Digitized by Google

Gas:						
Produced, M cubic feet	781,310,146	8,518,250	789,828,396	797,305,629	7,294,429	804,600,058
Disposal of surplus:						
Used under boilers, etc.:						
M cubic feet	61,335,328	109,590	61,444,918	62,831,638	125,593	62,957,231
Value	$11,927,274	$51,726	$11,979,000	$12,046,835	$41,826	$12,088,661
Average per M cubic feet	$0.194	$0.472	$0.195	$0.192	$0.333	$0.192
Used in steel or allied plants:						
M cubic feet	374,467,823	----------	374,467,823	384,536,696	----------	384,536,696
Value	$88,643,743	----------	$88,643,743	$90,323,508	----------	$90,323,508
Average per M cubic feet	$0.237	----------	$0.237	$0.235	----------	$0.235
Distributed through city mains:						
M cubic feet	[3] 31,686,990	6,054,189	[3] 37,741,179	30,000,450	4,809,528	34,809,978
Value	[3] $13,503,251	$4,203,844	[3] $17,707,095	$11,906,204	$2,876,743	$14,782,947
Average per M cubic feet	[3] $0.426	$0.694	[3] $0.469	$0.397	$0.598	$0.425
Sold for industrial use:						
M cubic feet	[3] 27,535,333	810,219	[3] 28,345,552	31,384,089	1,282,530	32,666,619
Value	[3] $5,054,199	$257,147	[3] $5,311,346	$5,548,925	$379,781	$5,928,706
Average per M cubic feet	[3] $0.184	$0.317	[3] $0.187	$0.177	$0.296	$0.181
Crude light oil:						
Produced, gallons	218,042,217	187,059	218,229,276	212,835,837	200,356	213,036,193
Sold, do	16,522,520	185,484	16,708,004	19,325,859	189,128	19,514,987
Value of sales	$2,785,585	$24,219	$2,809,804	$2,977,018	$15,909	$2,992,927
Light-oil derivatives:						
Produced, gallons	165,222,732	----------	165,222,732	161,988,753	----------	161,988,753
Sold, do	163,288,973	----------	163,288,973	163,837,395	----------	163,837,395
Value of sales	$47,370,524	----------	$47,370,524	$44,643,412	----------	$44,643,412
All other coal-chemical materials, value of sales	$23,367,297	$7,325	$23,374,622	$18,811,633	----------	$18,811,633

[1] Coke ovens built by city gas companies. Does not include independent oven-coke plants that may sell gas to public-utility companies for distribution.
[2] Includes di- and mono-ammonium phosphate and ammonium thiocyanate.
[3] Revised figure.

Digitized by Google

Digitized by Google

Fuel Briquets and Packaged Fuel

By Eugene T. Sheridan [1] and Virginia C. Berté [2]

Contents

	Page		Page
General summary	249	Fuel briquets—Continued	
Scope of report	250	Technology	258
Fuel briquets	252	Packaged fuel	260
Capacity	252	Capacity	260
Production	252	Production	260
Shipments	255	Shipments	262
Value and price	257	Value and price	263
Foreign trade	257	World review	263

GENERAL SUMMARY

DOMESTIC production of fuel briquets and packaged fuel continued to decline in 1959, and output was 17 and 6 percent, respectively, less than in 1958. Both fuels were used almost entirely for residential heating, but in recent years demand has decreased because fuel oil and natural gas have been substituted in many areas.

Fifteen fuel-briquet plants and 21 packaged-fuel plants operated in 1959. The fuel-briquet industry, however, is about 20 times larger than the packaged fuel industry. Productive capacity of both industries was about equal to 1958, but operating rates were lower, particularly in the fuel-briquet industry.

Eight States produced fuel briquets and seven States packaged fuel. Wisconsin led in briquet production and Michigan in packaged fuel. Both States are in the Central region where the largest quantities also were consumed.

About two-thirds of the briquets and virtually all packaged fuel were made from low-volatile bituminous coal. Binding materials were starch and asphalt—chiefly starch for packaged fuel and asphalt for briquets. One producer of packaged fuel, however, manufactured a large quantity with asphalt binder.

The total values of production were $12 million for fuel briquets and $0.8 million for packaged fuel. Prices were stable and the average sales value per ton, f.o.b. plant, were slightly higher than in 1958.

Foreign trade was insignificant; only 33,458 tons of briquets was exported and 185 tons imported. No packaged fuel was shipped to or received from foreign countries.

[1] Commodity industry analyst.
[2] Statistical clerk.

569112—60——17

Digitized by Google

TABLE 1.—Salient statistics of the fuel-briquetting and packaged-fuel industries in the United States, 1947–49 (average) and 1956–59

	1947–49 (average)	1956	1957	1958	1959
FUEL BRIQUETS					
Production net tons	2,901,348	1,518,540	1,104,781	1,035,261	866,120
Value of production	$31,805,000	$18,221,686	$14,802,033	$13,697,169	$12,026,319
Average per net ton, f.o.b. plant	$10.96	$12.00	$13.40	$13.23	$13.89
Imports [1] net tons	360	318	850	184	185
Exports [1] do	207,928	107,452	86,464	54,961	33,458
Apparent consumption [2] do	2,693,780	1,411,406	1,019,167	980,484	832,847
World production do	62,000,000	[3] 118,860,000	[3] 120,740,000	[3] 117,610,000	114,650,000
PACKAGED FUEL					
Production net tons	155,281	64,960	47,287	35,769	33,715
Value of production	$2,618,238	$1,381,880	$1,022,262	$828,116	$790,785
Average per net ton, f.o.b. plant	$16.86	$21.27	$21.62	$23.15	$23.45

[1] Compiled from records of the U.S. Department of Commerce. Excludes exports of briquets made from petroleum coke and residual carbon from manufacturing oil gas.
[2] Production plus imports minus exports. Import and export data do not include briquets made from petroleum products.
[3] Revised figure.

SCOPE OF REPORT

This report includes processed fuels of mineral origin only and specifically excludes charcoal briquets.

Fuel briquets are manufactured solid fuels, made by combining a binding material with mineral-fuel fines and compressing into solid shapes. Briquets usually are produced as small, pillow-shaped pieces, 2 to 4 inches in length, weighing 2 to 4 ounces. Packaged fuel is also made from fine-size mineral fuels; however, these fuels are compressed into 3- or 4-inch, brick-shaped objects, six or eight of which are wrapped together in heavy kraft paper to form a package weighing 10 to 15 pounds. Fuel briquets are manufactured in comparatively large plants at mines or docks; packaged fuel is made in small plants, which generally are operated by retail coal dealers who use this means of converting fines into a fuel that can be burned in conventional household heating equipment. Briquets are durable, may be stored outdoors, and shipped as bulk fuel. Packaged fuel is fragile and must be handled carefully because it breaks easily and must be stored indoors as it deteriorates unless kept dry.

Data on the fuel-briquet industry have been published annually since 1907, except in 1910 when no survey was conducted. Packaged-fuel statistics have been published annually since 1935. Both reports are based upon data supplied voluntarily by respective producers.

Questionnaires were mailed to 18 briquet plants; 15 reported production, 2 abandoned operations, and 1 was idle during 1959. (Abandoned were the Pine Grove and Lykens plants of the American Briquet Company, Philadelphia, Pa.) The lignite briquetting plant in Dickinson, N. Dak., resumed operations after being idle since 1956. This plant, formerly owned by Dakota Briquets and Tar Products, Inc., is now operated as the Husky Briquetting plant by the Husky Oil Company.

Digitized by Google

Twenty-eight packaged-fuel plants were canvassed and questionnaires were returned by 24. Twenty-one reported production, and three were abandoned. Of the four plants that did not reply, three were idle in 1958, while the fourth reported only a small production. All were assumed to be idle in 1959.

The average of the 3-year period (1947–49) was used as a base for measuring production and consumption trends. All quantities were reported in short tons, and production values for briquets and packaged fuel were based upon the average value of sales, f.o.b. plant, as reported by producers.

Production and raw materials data were shown by regions because of the small number of producing companies in certain States. For fuel briquets, the regions are as follows: Eastern—West Virginia; Central—Illinois, Indiana, Michigan, and Wisconsin; and Western—Arkansas, Missouri, and North Dakota. For packaged fuel the regions are: Eastern—Ohio and Virginia; Central—Illinois, Indiana, Michigan, and Wisconsin; and Western—Minnesota.

Data on stocks are not collected, as briquets and packaged fuel normally are consumed during the year in which they are produced. There is usually a small difference between production and sales, however, as small quantities are used at the plant and the remainder sold in the following year.

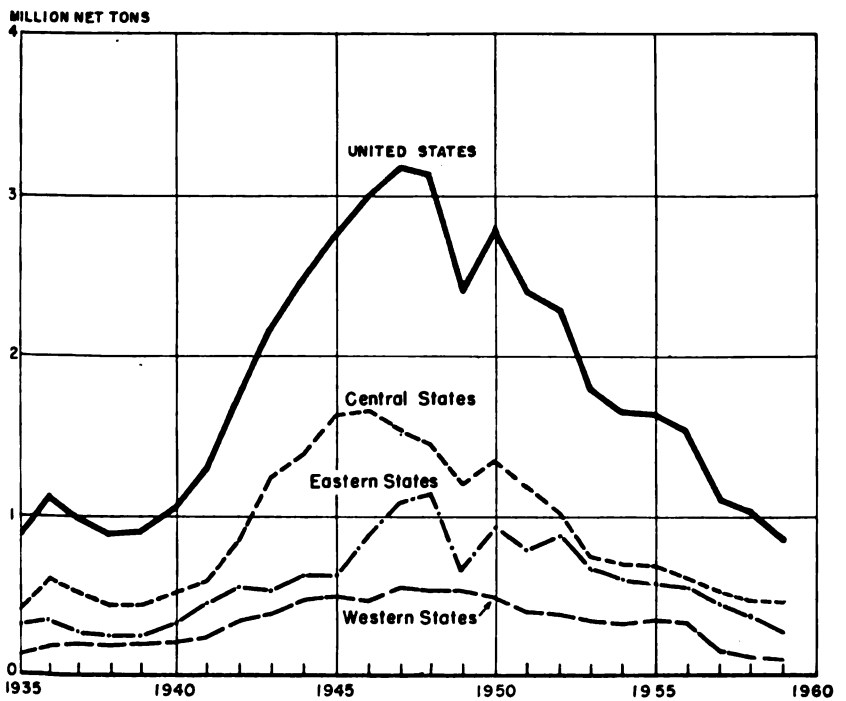

FIGURE 1.—Production of fuel briquets in the United States, 1935–59, by regions.

Digitized by Google

FUEL BRIQUETS

CAPACITY

Productive capacity of the fuel-briquet industry decreased slightly in 1959 because two plants with a combined productive capacity of 130,000 tons abandoned operations, but this decrease was nearly offset by the capacity of the lignite plant that resumed operations and by an increase in capacity at one other plant. Plant capacity ranged from 30,000 tons to 600,000 tons; nearly half of the plants had capacities ranging from 100,000 to 200,000 tons, while five plants had a capacity of less than 100,000 tons. Operating rates declined substantially in 1959, and production in terms of capacity was 5 points lower than in 1958. Plants generally maintain existing capacity, however, unless they abandon operations.

TABLE 2.—Annual capacity and production of briquetting plants in the United States, 1955–59

	Active plants	Annual capacity (net tons)	Production	
			Net tons	Percent of capacity
1955	23	3,841,000	1,629,542	42.4
1956	21	3,716,000	1,518,540	40.9
1957	17	3,088,000	1,104,781	35.8
1958	16	3,018,000	1,035,261	34.3
1959:				
Plants with capacity of—				
Less than 25,000 tons				
25,000 to less than 100,000 tons	5	248,000	89,691	36.2
100,000 to less than 200,000 tons	4	447,500	205,577	45.9
200,000 to less than 400,000 tons	3	760,000	142,694	18.8
400,000 or more tons	3	1,500,000	428,158	28.5
Total	15	2,955,500	866,120	29.3
Plants with production of—				
Less than 5,000 tons	1	1,100,000	341,449	31.0
5,000 to less than 10,000 tons	1	(1)	(1)	(1)
10,000 to less than 25,000 tons	4	396,000	77,864	19.7
25,000 to less than 100,000 tons	7	1,459,500	446,807	30.6
100,000 or more tons	2	(1)	(1)	(1)
Total	15	2,955,500	866,120	29.3

[1] Included with "Less than 5,000 tons" to avoid disclosing individual company figures.

PRODUCTION

Production of fuel briquets decreased 17 percent in 1959, as 2 plants permanently discontinued operations, and 10 plants reported less production than in 1958. Demand for briquets has declined steadily during the past decade, and output in 1959 was only 30 percent of the base years, 1947–49.

Fifteen plants in eight States reported production, but more than three-fourths of the total output was made in West Virginia and Wisconsin. Wisconsin, with six operating plants, had the largest number of plants and also the greatest production. West Virginia had two plants and was second in production. All briquets produced in Wisconsin were made in the northern and eastern Lake Dock areas.

Digitized by Google

Briquets in West Virginia were produced in the southwestern mining districts of McDowell and Wyoming Counties. Other States in order of output were Missouri, Michigan, North Dakota, Illinois, Indiana, and Arkansas. No briquets were produced in Pennsylvania, as the only two briquet plants in that State were abandoned in 1959. North Dakota, however, again became a producing State as the lignite briquetting plant in Dickinson resumed operations under new ownership.

Table 3 shows production in 1958–59. Production is shown by regions because all States except Wisconsin had less than three producing companies. Wisconsin produced 382,027 tons of briquets, valued at $6,140,548 in 1959.

Briquets were used chiefly for space heating, and production was seasonal, ranging from 136,031 tons in November to 30,327 tons in March (table 4).

Raw Fuels.—Briquets were manufactured from eight different fuels in 1959, but nearly two-thirds of the total was low-volatile bituminous coal. Other fuels, in order of quantities consumed, were petroleum coke, Pennsylvania anthracite, high-volatile bituminous coal, lignite char, semianthracite, bituminous coke, and other anthracite. Of the total raw fuels, 65 percent was low-volatile bituminous coal; 20 percent, petroleum coke; and 5 percent, Pennsylvania anthracite. Low-volatile bituminous coal made up approximately the same percent of total raw fuels as in the previous year. Petroleum-coke consumption, however, increased about 6 percent from 1958, while Pennsylvania-anthracite consumption decreased by nearly two-thirds.

TABLE 3.—Production and value of fuel briquets in the United States, 1958–59, by regions

Region	1958				1959			
	Active plants	Production (net tons)	Value		Active plants	Production (net tons)	Value	
			Total	Average			Total	Average
Eastern States	4	438,841	$4,780,311	$10.89	2	(1)	(1)	(1)
Central States	9	479,452	7,122,644	14.86	9	750,129	$10,279,633	$13.70
Western States	3	116,968	1,794,214	15.34	4	115,991	1,746,686	15.06
Total	16	1,035,261	13,697,169	13.23	15	866,120	12,026,319	13.89

[1] Included with "Central States" to avoid disclosing individual company figures.

TABLE 4.—Production of fuel briquets in the United States in 1959, by months

Month	Net tons	Month	Net tons	Month	Net tons
January	129,343	May	44,661	September	73,004
February	96,742	June	54,547	October	111,756
March	30,327	July	34,040	November	136,031
April	40,248	August	32,736	December	82,685

Low-volatile bituminous coal was used at 11 plants, 9 of which also used other fuels. Nine plants used petroleum coke plus other fuels, and five plants used Pennsylvania anthracite with other fuels. The

Digitized by Google

two plants in Pennsylvania that were abandoned had used Pennsylvania anthracite exclusively in past years. Sixteen percent of the raw fuels was yard screenings, but the greater part was screened coals from bituminous mines, petroleum coke from refineries, and Pennsylvania anthracite fines. No plants used yard screenings exclusively, but six plants used yard screenings with fuel from other sources. Nine plants did not use yard screenings.

The average value per ton for raw fuels increased 6 percent in 1959, chiefly because of higher prices paid for low-volatile bituminous coal and Pennsylvania anthracite. Pennsylvania anthracite had a much higher unit value than in 1958 because all used for briquets was consumed at points far from where it was produced. Anthracite other than Pennsylvania had the highest unit value, and lignite char had the lowest. The average value of the raw fuels in each ton of fuel briquets manufactured in 1959 was $8.02. This was about four-fifths the value of total raw materials per ton and about three-fifths the value of each ton of briquets produced.

TABLE 5.—Raw fuels used in making fuel briquets in the United States in 1959

Type	Number of plants	Used		
		Net tons	Value	
			Total	Average
Anthracite:				
Pennsylvania	5	43,020	$436,341	$10.14
Other than Pennsylvania	1	(1)	(1)	(1)
Semianthracite	2	(1)	(1)	(1)
Bituminous coal:				
Low-volatile	11	536,908	4,419,397	8.23
High-volatile	3	30,237	175,964	5.82
Petroleum coke	9	167,952	1,604,950	9.56
Coke	2	(1)	(1)	(1)
Lignite char	1	(1)	(1)	(1)
Undistributed	----------	46,059	313,126	6.80
Total	[2] 15	824,176	6,949,778	8.43

[1] Included with "Undistributed" to avoid disclosing individual company figures.
[2] Some plants used more than 1 type of raw fuel; hence, the number of plants exceeds the total shown.

Binders.—Except for a small quantity of starch used by one plant, petroleum asphalt was used exclusively as a binder for briquets. In past years, other materials such as coal-tar pitch were used, but petroleum asphalt is currently preferred because of its good cohesive properties, relatively low cost, insolubility in water, and low ash content. Binders generally constitute 6 to 8 percent of the total raw materials (exclusive of water), and in 1959 an average of 145 pounds of binder was used for each ton of raw fuel. In addition to binder, a small quantity of spray oil was used by two plants. This was included under binders in table 6, although spray oil cannot be considered properly as a binding material because it was sprayed on finished briquets and was used primarily for dust control.

The average value per ton for all binder (including spray oil) consumed in 1959 was $27.79. This was slightly less than the unit value of binder used in 1958, chiefly because of lower prices for asphalt.

Digitized by Google

The average value of binders contained in each ton of fuel briquets manufactured in 1959 was $1.92. This was about one-fifth the value per ton of total raw materials and about one-seventh the value of each ton of briquets produced.

TABLE 6.—Quantity and value of raw materials used in making fuel briquets in the United States and quantity and value of sales in 1959, by regions

Region	Raw materials used					
	Fuels			Binders [1]		
	Net tons	Value		Net tons	Value	
		Total	Average		Total	Average
Eastern States	(2)	(2)	(2)	(2)	(2)	(2)
Central States	717,269	$6,167,604	$8.60	50,601	$1,439,108	$28.44
Western States	106,907	782,174	7.32	9,084	219,806	24.20
Total	824,176	6,949,778	8.43	59,685	1,658,914	27.79

Region	Total raw materials			Fuel briquets sold		
	Net tons	Value		Net tons	Value	
		Total	Average		Total	Average
Eastern States	(2)	(2)	(2)	(2)	(2)	(2)
Central States	767,870	$7,606,712	$9.91	741,036	$10,134,698	$13.68
Western States	115,991	1,001,980	8.64	117,552	1,772,717	15.08
Total	883,861	8,608,692	9.74	858,588	11,907,415	13.87

[1] Includes 512 tons of spray oil used by 2 plants for dustproofing briquets.
[2] Included with "Central States" to avoid disclosing individual company figures.

SHIPMENTS

Briquets manufactured in the United States in 1959 were consumed in 28 States and shipped to 2 foreign countries. The quantities consumed in individual States varied extensively, however, and ranged from 39 tons in Texas to nearly 200,000 tons in Wisconsin. The terms "distribution" and "consumption" are used synonymously in this report, as it is assumed that briquets were consumed in the States where shipped by producers.

Wisconsin was the chief consumer of briquets and used 21 percent of the total distributed—largely its own output; but small quantities were received from Missouri and West Virginia. Wisconsin consumed nearly half of its production and shipped the remainder to eight neighboring States and Canada. The largest quantities were shipped to Minnesota, South Dakota, and North Dakota, who received 44, 15, and 14 percent, respectively, of Wisconsin's shipments.

Michigan ranked second in consumption, receiving 14 percent of the total, followed by Minnesota with 11 percent, Missouri with 10, and Indiana with 9. Most of the briquets consumed in Missouri were produced within the State. Michigan and Indiana received a large

Digitized by Google

part of their requirements from other States, and Minnesota was supplied entirely by out-of-State shipments.

Virtually all briquets produced in West Virginia were shipped to 18 other States and Canada because cheaper fuels were readily available in all parts of the State. Indiana, Michigan, Ohio, and Virginia were the chief recipients of West Virginia's shipments, receiving 26, 19, 17, and 11 percent, respectively, of the total.

Seventy-five percent of the briquet shipments were by rail. However, type of transportation varies with the regions in which briquets are produced. In the Eastern States, virtually all briquets were shipped to destinations too distant for practical delivery by truck, but in the Western States region (particularly Missouri) more briquets were shipped by truck as they were consumed chiefly within the producing State.

Only 28,000 tons of briquets were reported shipped to foreign countries by producers. Export data as shown by the Bureau of Mines (table 7) differ slightly from those compiled by the Bureau of the Census (table 9), because some briquets shipped by producers to certain States may have been shipped eventually to foreign countries by export firms in those States. Also, briquets made from petroleum products were included in the Bureau of Mines table, whereas the Bureau of the Census excluded them.

Except for one plant in Wisconsin that packaged a few hundred tons in cartons, all briquets were sold in bulk in 1959. Shipments by States of origin were not shown because of the small number of producing companies in most States.

TABLE 7.—Destination of shipments of fuel briquets, 1958–59, in net tons

[Based upon reports from producers showing destination of briquets used or sold]

Destination	1958	1959	Destination	1958	1959
Arkansas	1,349	1,107	North Carolina	36,698	25,297
California	----------	1,000	North Dakota	28,669	40,532
Connecticut	1,128	----------	Ohio	63,186	49,835
Delaware	58	----------	Oklahoma	36	----------
District of Columbia	546	----------	Pennsylvania	7,063	371
Florida	203	47	Rhode Island	208	----------
Illinois	64,989	43,188	South Carolina	2,563	1,110
Indiana	102,274	77,088	South Dakota	33,887	32,351
Iowa	31,614	28,945	Tennessee	1,352	916
Kansas	6,153	5,606	Texas	----------	39
Kentucky	4,665	3,413	Vermont	794	----------
Maine	3,207	115	Virginia	45,664	32,286
Maryland	4,723	849	Washington	1,333	1,574
Massachusetts	3,243	101	West Virginia	1,284	408
Michigan	126,648	118,413	Wisconsin	188,686	178,378
Minnesota	92,973	92,419			
Missouri	125,640	89,744	Total	992,402	830,926
Nebraska	6,393	5,696	Exported	42,707	27,662
New Hampshire	996	----------			
New Jersey	936	----------	Grand total	1,035,109	858,588
New York	3,241	98			

Digitized by Google

TABLE 8.—Shipments of fuel briquets in the United States, 1958–59, by methods of transportation, in net tons [1]

Origin	1958			1959		
	Rail	Truck [2]	Total	Rail	Truck [2]	Total
Eastern States	428,763	9,215	437,978	283,123	166	283,289
Central States	338,262	139,581	477,843	320,759	136,988	457,747
Western States	22,574	94,394	116,968	41,338	76,214	117,552
Total	789,599	243,190	[3] 1,032,789	645,220	213,368	[3] 858,588

[1] Includes shipments destined for export as reported by producers directly to the Bureau of Mines.
[2] Includes small quantity shipped by barge.
[3] An additional 2,320 tons was used by 1 producer in 1958 as fuel and 2,110 tons by 1 producer in 1959.

VALUE AND PRICE

Prices remained firm during 1959, and the average value per ton, f.o.b. plant, for all briquets sold was about 5 percent higher than in 1958. The total value of production was slightly over 12 million dollars, a decrease of 12 percent from 1958, chiefly because of the smaller output. The total value of production was calculated by multiplying total production by average receipts per ton, f.o.b. plant, of commercial sales.

Briquets produced in the Eastern States had a lower value per ton than those produced in other regions, because the eastern plants are located near the source of their raw fuels. However, these briquets generally are shipped farther than briquets in other regions, and transportation charges on the finished product approximates the additional cost of raw fuels in the Central and Western regions. Hence, retail prices are essentially competitive.

FOREIGN TRADE [3]

Foreign trade was relatively unimportant in 1959 as only 4 percent of total shipments was exported and a negligible quantity imported.

The quantity of briquets exported annually has declined substantially during the past decade, but in relation to total shipments, exports were only slightly lower in 1959 than in 1947–49. Canada remained the principal export market and received all foreign shipments except 100 tons that was exported to British Honduras. Canadian markets, however, have declined rapidly, chiefly because other fuels have replaced briquets as domestic and railway fuels.

Except for a few years prior to 1940, imports have always been insignificant. Imports in 1959 were only 185 tons, all of which entered the United States through the Washington customs district, except 6 tons that was shipped into Maryland.

Export data (table 9) on fuel briquets were compiled and published by the Bureau of the Census. Only briquets made from coal and bituminous coke were included (see Shipments, page 255).

[3] Figures on imports and exports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the Bureau of the Census.

Digitized by Google

TABLE 9.—Fuel briquets (coal and coke) exported from the United States, 1957–59, by countries of destination and customs districts

[Bureau of the Census]

	1957		1958		1959	
	Net tons	Value	Net tons	Value	Net tons	Value
COUNTRY						
North America:						
British Honduras					100	$2,550
Canada	86,242	$1,376,904	53,311	$867,662	33,358	492,728
Guatemala			50	1,270		
Mexico			62	3,042		
Total	86,242	1,376,904	53,423	871,974	33,458	495,278
South America:						
Bolivia	222	5,678				
Brazil			1,538	26,915		
Total	222	5,678	1,538	26,915		
Grand total	86,464	1,382,582	54,961	898,889	33,458	495,278
CUSTOMS DISTRICT						
Arizona			36	360		
Buffalo	34,219	588,243	22,408	395,409	1,825	31,357
Dakota	16,683	233,825	10,463	153,886	12,770	174,903
Duluth and Superior	12,148	176,250	9,738	142,864	9,023	141,056
Galveston			26	2,682		
Massachusetts	30	705				
Michigan	4,651	52,762	2,872	35,444	5,979	77,707
Minnesota			50	575	50	806
New Orleans	222	5,678				
Ohio	90	1,053			892	12,211
Philadelphia			1,538	26,915		
St. Lawrence	15,308	285,219	7,350	134,604	2,429	49,898
Vermont	1,203	15,457				
Other [1]	1,910	23,390	480	6,150	490	7,340
Total	86,464	1,382,582	54,961	898,889	33,458	495,278

[1] Estimated from sample data; district data not available.

TECHNOLOGY

The Sixth Biennial Briquetting Conference was held at Glacier Park, Mont., August 24–26, 1959. New developments on briquetting were discussed and several technical papers of interest to producers and the briquetting industry, in general, were presented.

Laboratory studies [4] conducted by the Canadian Department of Mines and Technical Surveys showed that lignite and subbituminous coal can be briquetted successfully without binder by a process that involves preheating for several minutes at temperatures of 400° to 600° C. and compressing at pressures ranging from 2.5 to 39 tons per square inch for subbituminous and 12.7 tons per square inch for lignite. The fuels were preheated to remove the lighter oils and liberate the tars that, under pressure, bound the particles together. Similar tests were made with medium-volatile bituminous coking coal and semianthracite, but the strongly coking, highly expanding, bituminous coal required the addition of inert materials such as sand or nonswelling coal, whereas semianthracite could be briquetted only when

[4] McKenzie, A. R., Picard, J. L., and Visman, J., A Laboratory Study of the Binderless Briquetting of Western Canadian Coals: Dept. of Mines and Tech. Surveys, Ottawa, Canada, Tech. Bull. 10, December 1959.

Digitized by Google

mixed with coking coal. The studies were conducated on a laboratory scale only, but the results indicate that it may be possible to produce good binderless briquets on a commercial scale if a press can be developed that will briquet at pressures up to 13 tons per square inch and will handle coal preheated to temperatures of 450° to 600° C.

Another process for briquetting coal without binder was presented at the Briquetting Conference by H. R. Gregory of the National Coal Board of Great Britain. This process applies a new technique for compacting powdered materials without binder by using a duplex plunger-type briquetting machine or mechanical expansion press. Both machines provide a more uniform distribution of angular shear strain at a maximum pressure, with subsequent increases in strength and density of the finished briquets.

The Canadian Department of Mines and Technical Surveys recently published the results of studies [5] evaluating the physical quality of briquets by the application of certain statistical methods. The report presents recent researches in coal briquetting with binders and describes the two simple physical tests for evaluating quality, namely, the compressive strength test and the tumbler test. Both tests are reliable under certain conditions, but, as briquetting is a complicated process with many variables that are important either by themselves or by their interactions, the factors responsible for particular physical characteristics usually cannot be determined. Results of a series of tests conducted in several briquet plants in Western Canada showed that the respective influences of different factors affecting quality can be determined with some precision by applying statistical methods. Statistical techniques employed included factorial test design, analysis of variance, calculations of regression and correlation formulas, and applications of tests of significance. The report concluded that the minimum number of tests can be greatly reduced and the influence of each factor, as well as the interaction of factors, can be ascertained and quantitatively expressed by the use of statistical methods.

The Federal Bureau of Mines, under an agreement with the International Cooperation Administration (ICA), recently completed studies [6] for the Government of India on the briquetting of raw lignite fuel from a deposit in Madras State, India. Previous studies in India and Germany had shown that Indian lignite could be briquetted without binder. The process developed by the Bureau of Mines consisted of crushing and drying lignite in a fluidized drier to a moisture content of about 10 percent. The hot dried lignite was then briquetted in a high-pressure Glomera extrusion press at a pressure of approximately 30,000 p.s.i. and at a rate of about 10,000 briquets per hour. The briquets produced were extremely hard and strong. They then were carbonized in a continuous vertical carbonizer with subsequent recovery of gas and tar. The laboratory research demonstrated the technical feasibility of producing smokeless, easily ignited briquets from this lignite. Therefore, the techniques were transferred to a 2½-

[5] Charbonnier, R. P., and Visman, J., Briquetting Coal With Binders and Statistical Evaluation of Briquet Tests: Department of Mines and Technical Surveys, Ottawa, Canada, Tech. Bull. 9, October 1959.

[6] Landers, W. S., Binderless Briquetting of Indian Lignite: Proceedings of International Briquetting Association, 6th Biennial Briquetting Conf., 1959.

Digitized by Google

ton-per-hour pilot plant in India that was supplied to the Government of India by ICA. The plant was completed in August 1958 and has since produced carbonized briquets with excellent ignition and burning properties and adequate strength.

PACKAGED FUEL

CAPACITY

Annual productive capacity of the packaged-fuel industry decreased 3 percent from 1958. As with fuel briquets, this industry has also declined during the past decade and capacity in 1959 was about one-third of that in 1947–49. Active plants during this period have decreased from 60 to 21 and total annual capacity has been reduced from 385,000 tons to 138,100 tons. Packaged-fuel plants are small, and 15 of the 21 active plants had an annual capacity of less than 5,000 tons. Only one plant had a capacity in excess of 25,000 tons. The largest plant was in Michigan and the second largest in Wisconsin.

Operating rates also declined slightly, and production in terms of capacity was about one point lower than in 1958. The decline in the rate of operations is inconclusive, however, as packaged-fuel plants, like briquet plants, generally maintain existing capacity unless they abandon operations.

TABLE 10.—Annual capacity and production of packaged-fuel plants in the United States, 1955–59

	Active plants	Annual capacity (net tons)	Production	
			Net tons	Percent of capacity
1955	31	198,400	69,212	34.9
1956	26	174,600	64,960	37.2
1957	23	150,200	47,287	31.5
1958	23	141,800	35,769	25.2
1959:				
Plants with capacity of—				
Less than 5,000 tons	15	32,300	5,072	15.7
5,000 to less than 10,000 tons	2	13,800	1,576	11.4
10,000 to less than 15,000 tons	2	[1] 92,000	[1] 27,067	29.4
15,000 to less than 25,000 tons	1			
25,000 or more tons	1			
Total	21	138,100	33,715	24.4
Plants with production of—				
Less than 1,000 tons	16	40,100	5,613	14.0
1,000 to less than 3,000 tons	2	16,000	2,715	17.0
3,000 to less than 5,000 tons	1	[1] 82,000	[1] 25,387	31.0
5,000 to less than 10,000 tons	1			
10,000 or more tons	1			
Total	21	138,100	33,715	24.4

[1] Combined to avoid disclosing individual company figures.

PRODUCTION

Production decreased 6 percent as three plants abandoned operations at the end of 1958. The decrease was offset slightly by the output of one plant in Michigan that had not reported production since 1954. Demand for packaged fuel has declined steadily during the past

Digitized by Google

decade, and output in 1959 was less than one-fourth that of the base years, 1947–49.

Twenty-one plants in seven States reported production. Michigan, with five producing companies, had nearly half the total output. Ohio had the largest number of active plants, but plants in Ohio are relatively small, and output per plant averaged less than 600 tons. The largest producing plants were in Michigan and Wisconsin.

Like briquets, packaged fuel was used for domestic heating and demand was seasonal. Production varied directly with demand, as packaged fuel generally is consumed as produced because of high storage costs. Monthly output ranged from 5,637 tons in January to 58 tons in June.

TABLE 11.—Production and value of packaged fuel in the United States, 1958–59, by States

State	1958				1959			
	Active plants	Production (net tons)	Value		Active plants	Production (net tons)	Value	
			Total	Average			Total	Average
Indiana	3	5,945	$119,941	$20.18	3	4,842	$104,324	$21.55
Michigan	5	16,069	369,438	22.99	5	16,021	387,838	24.21
Ohio	8	5,656	112,003	19.80	7	3,983	89,088	22.37
Other States	7	8,099	226,734	28.00	[1] 6	8,869	209,535	23.63
Total	23	35,769	828,116	23.15	21	33,715	790,785	23.45

[1] Comprises 2 plants each in Minnesota and Virginia and 1 plant each in Illinois and Wisconsin.

The quantity of packaged fuel produced was slightly less than total raw materials used because of breakage and other minor losses.

Raw Fuels.—Except for a small quantity manufactured from petroleum coke, all packaged fuel was made from low-volatile bituminous coal. About 17 percent of the raw fuels was yard screenings that had accumulated in producers' coalyards. The remainder came from other sources and consisted chiefly of coal fines that were screened at mines or accumulated at loading and unloading points. Ten plants used yard screenings exclusively; six used only other fuels; and five used both yard screenings and other fuels.

Raw fuels were slightly higher in value than in 1958, chiefly because of the increased cost of low-volatile bituminous coal in Wisconsin. The average value of raw fuel in each ton of packaged fuel was $10.50, 94 percent of the value of total raw materials per ton and about 45 percent of the value of each ton of packaged fuel produced. Raw fuel had the highest value per ton in Wisconsin and the lowest in Virginia.

TABLE 12.—Production of packaged fuel in the United States in 1959, by months

Month	Net tons	Month	Net tons	Month	Net tons
January	5,637	May	636	September	1,484
February	5,142	June	58	October	3,212
March	3,948	July	755	November	4,292
April	2,808	August	1,475	December	4,268

Digitized by Google

Binders.—Starch and asphalt were used as binders, but starch was preferred by 20 of the 21 active plants. Although relatively expensive, starch is preferred over asphalt because only small quantities are required and binder cost per ton of packaged fuel is much lower. An average of only 10 pounds of starch costing $0.63 was used in manufacturing each ton of packaged fuel in 1959 by the plants that employed starch as a binder. Data cannot be shown for the plant using asphalt, but packaged fuel made with asphalt requires quantities of binder comparable to that required for fuel briquets. For comparison, approximately 137 pounds of asphalt costing $1.88 was used in manufacturing each ton of fuel briquets in 1959.

Table 13 shows, by regions, the quantity and value of binders consumed in 1959. The total average value per ton for binders ($49.35) is considerably lower than the average value of starch binders, because one plant in the Central States region used asphalt.

TABLE 13.—Quantity and value of raw materials used in making packaged fuel in the United States and quantity and value of sales in 1959, by regions

Region	Raw materials used					
	Fuels			Binders		
	Net tons	Value		Net tons	Value	
		Total	Average		Total	Average
Eastern States	4,973	$48,301	$9.71	40	$4,771	$119.28
Central States	28,683	305,675	10.66	547	24,200	44.24
Western States	(1)	(1)	(1)	(1)	(1)	(1)
Total	33,656	353,976	10.52	587	28,971	49.35

Region	Total raw materials			Packaged fuel sold		
	Net tons	Value		Net tons	Value	
		Total	Average		Total	Average
Eastern States	5,013	$53,072	$10.59	4,907	$110,663	$22.55
Central States	29,230	329,875	11.29	26,312	619,261	23.54
Western States	(1)	(1)	(1)	(1)	(1)	(1)
Total	34,243	382,947	11.18	31,219	729,924	23.38

[1] Combined with "Central States" to avoid disclosing individual company figures.

SHIPMENTS

All packaged fuel was delivered by truck, and the major part was sold locally. The remainder was reported shipped to other than local destinations. Data are not available on these shipments, but they probably terminated within the producing State or in nearby States. Production exceeded shipments by 8 percent. Only three plants sold less packaged fuel than they produced, however, as production generally only keeps pace with demand. No packaged fuel has been shipped by rail since 1953.

Digitized by Google

TABLE 14.—Shipments of packaged fuel in the United States, 1955–59, by methods of transportation, in net tons

Year	Shipped by truck		
	Local sales	Other than local sales	Total
1955	57,051	12,159	69,210
1956	51,933	11,482	63,415
1957	39,739	7,475	47,214
1958	36,862	(1)	36,862
1959	31,219	(1)	31,219

[1] Combined with "Local sales" to avoid disclosing individual company figures.

VALUE AND PRICE

The total value of packaged fuel produced in 1959 decreased 5 percent because of the smaller output. Prices were stable, however, and the average value per ton was slightly higher than in 1958. The total value of production was $791,000, a little less than in 1958, but less than one-third the total value for 1947–49. As with fuel briquets, the value of production was calculated from the f.o.b. plant values of commercial sales, as reported by producers.

Packaged fuel sold in 1959 had an average value per ton, f.o.b. plant, of $23.38. Except for delivery charges (some packaged fuel was purchased at the plant by consumers), this value was equivalent to the average retail price as most producers sold directly to users. Fuel briquets had a much lower value per ton, because manufacturing costs were lower and the briquets were marketed on a much larger scale and in a different manner. In general, transportation charges, handling expenses, and profits at both wholesale and retail levels must be added to briquet values to make them comparable to packaged-fuel values, as shown, in this report.

Packaged fuel sold in Wisconsin had the highest average value per ton; Minnesota had the lowest.

WORLD REVIEW [1]

Estimated world production of fuel briquets in 1959 was 114.7 million tons. Total production decreased slightly from 1958, chiefly because of a 10-percent decrease in output in West Germany.

Ninety-four percent of all briquets were produced in 21 European countries; more than half the European output, however, was manufactured in East Germany from lignite. West Germany produced about one-fifth of the total, also chiefly from lignite. Both countries have been briquetting for many years as a means of using their large reserves of lignite, and both use briquets extensively for residential and industrial heating.

The Soviet Union contributed 8 percent to the world production, followed by France with 6 percent. Belgium, Hungary, Netherlands, Spain, and the United Kingdom each produced more than one million tons, but their combined output was only 6 percent of the world total. Japan and Korea were the chief Asiatic producers, with 95 percent of

[1] Figures on world production compiled by Pearl J. Thompson and Berenice B. Mitchell, Division of Foreign Activities, Bureau of Mines.

Digitized by Google

the briquets made in Asia. Their combined output, however, was only 4 percent of the world total. Smaller quantities were produced in Canada, Peru, Algeria, Morocco, Tunisia, Australia, and New Zealand. The United States with less than one million tons supplied less than 1 percent of the world output.

TABLE 15.—World production of fuel briquets and packaged fuel in 1955–59, by countries, in thousand net tons [1]

Country	1955	1956	1957	1958	1959
North America:					
Canada	654	753	395	204	[2] 182
United States:					
Briquets	1,630	1,519	1,105	1,035	866
Packaged fuel	69	65	47	36	34
Total	2,353	2,337	1,547	1,275	1,082
South America: Peru	4	[2] 4	18	9	[2] 9
Europe:					
Austria	12	8	13	2	
Belgium	1,713	2,014	2,023	1,143	[2] 1,069
Bulgaria [2]	250	255	255	275	275
Czechoslovakia:					
Bituminous	384	324	365	[2] 370	[2] 370
Lignite	327	348	340	[2] 340	[2] 340
Denmark	91	94	107	[2] 110	[2] 88
Finland		11	11	13	[2] 11
France	7,392	8,706	9,100	7,813	7,232
Germany:					
East, lignite	56,181	56,917	58,826	59,534	59,578
West:					
Bituminous	7,621	8,498	8,624	6,209	5,192
Lignite	18,123	18,691	18,547	18,119	16,761
Hungary	755	725	806	1,049	[2] 1,100
Ireland	47	56	37	42	44
Italy, anthracite	28	28	18	12	28
Netherlands:					
Bituminous	1,076	1,139	1,259	1,197	1,168
Lignite	94	86	89	83	71
Poland:					
Bituminous	770	714	732	704	[2] 760
Lignite	202	206	257	[2] 260	[2] 325
Portugal	106	112	100	83	[2] 65
Rumania [2]	285	285	300	300	305
Spain	1,303	1,427	1,523	1,580	[2] 1,455
Sweden	77	71	77	69	[2] 65
Switzerland [2]	110	110	110	110	110
U.S.S.R. [2]	9,400	9,400	9,400	9,400	9,400
United Kingdom	1,883	1,990	2,359	2,424	[2] 1,985
Yugoslavia	28	28	8	19	[2] 11
Total [2]	108,300	112,200	115,300	111,300	107,800
Asia:					
Indonesia	37	25	37	32	[2] 28
Japan	2,905	[2] 2,980	2,567	[2] 2,540	[2] 2,480
Korea, Republic of	101	406	363	[2] 1,450	[2] 2,200
Pakistan [2]	13	13	13	13	17
Turkey	103	75	65	128	[2] 140
Vietnam, South [2]	55	55	55	55	60
Total	3,214	3,554	3,100	4,218	4,925
Africa:					
Algeria	26	34	47	56	23
Morocco: Southern zone	19	19	21	20	22
Tunisia	10	4	6	2	[2] 5
Total	55	57	74	78	50
Oceania:					
Australia	712	692	683	712	[2] 760
New Zealand	14	18	18	19	[2] 20
Total	726	710	701	731	780
World total [2]	114,650	118,860	120,740	117,610	114,650

[1] Includes briquets made from coal, lignite, and peat and revisions of data published previously. Data do not add to totals shown owing to rounding.
[2] Estimated.

Digitized by Google

Peat

By Eugene T. Sheridan [1] and Virginia C. Berté [2]

Contents

	Page		Page
General summary	265	Value and price	274
Government regulations	266	Foreign trade	275
Scope of report	266	Technology	276
Reserves	268	World review	279
Production	269		
Consumption, uses, and shipments	271		

GENERAL SUMMARY

PEAT PRODUCTION in the United States in 1959 was 419,460 net tons. This was 28 percent more peat than was produced in 1958 and more than three times that produced in 1947–49. Imports and domestic sales increased in 1959. As a result, more peat was consumed by this Nation in 1959 than in any previous year.

There were 104 commercial producers in 19 States in 1959. Michigan had the largest number with 33, followed by Ohio with 11 and Washington with 10. Michigan produced nearly 50 percent of the total, followed by California and Florida with 8 percent each. Output was valued at $4,372,194.

Sixteen percent of the production was reported as moss peat, 47 percent as reed-sedge peat, and 37 percent as peat humus. Seventeen percent of the total was raw peat, sold as excavated except that it was air dried. The remainder was processed by shredding, pulverizing, and/or kiln drying.

Domestically produced peat was distributed in 44 States and the District of Columbia; sales were nearly equal to production. About one-third of the total was packaged in bags or baled.

Dollar value of production increased in 1959, but average unit value was slightly lower than in 1958. Reed-sedge peat had the highest unit value ($13.68), moss peat was second ($12.41), and humus was third ($5.50). However, these values are inconclusive, because sales value depends more upon the amount of processing and whether or not the peat is packaged than upon type. The average value per ton for peat sold in bulk was $6.57 compared with $16.45 per ton for packaged peat.

[1] Commodity industry analyst.
[2] Statistical clerk.

569112—60——18

Digitized by Google

TABLE 1.—Salient statistics of the peat industry in the United States, 1947–49 (average) and 1956–59

	1947–49 (average)	1956	1957	1958	1959
Number of operations	45	75	76	81	105
Production net tons	131,782	272,972	316,217	327,813	419,460
Value of production	$939,518	$2,319,957	$3,458,459	$3,445,767	$4,372,194
Average per net ton	$7.13	$8.50	$10.94	$10.51	$10.42
Imports [1] net tons	88,462	247,689	246,759	269,096	286,719
Available for consumption [2] do	220,244	520,661	562,976	596,909	706,179
World production do	50,000,000	[3] 59,450,000	[3] 70,630,000	[3] 65,510,000	70,600,000

[1] Compiled from records of the U.S. Department of Commerce.
[2] Production plus imports.
[3] Revised figure.

GOVERNMENT REGULATIONS

There are no national standards for the various types of peat. However, the peat industry is governed by trade practice rules, established by the Federal Trade Commission in 1950, designed to promote fair competitive practices within the industry and to protect the marketing public. In general, these rules forbid unfair or deceptive trade practices in marketing, misrepresentations, and the deceptive use of trade or corporate names. They also give requirements for labeling a product "peat" and state the manner in which the terms "peat moss" and "moss peat" may be used. Peat is defined as any partly decomposed vegetable matter that accumulates under water or in a water-saturated environment through the decomposition of mosses, reeds, sedges, tule, trees, or other plants. It is unlawful to designate as "peat" any product whose composition is less than 75 percent (by weight, dry basis) peat, and the remainder must consist of normally associated soil materials. A material labeled "moss peat" must contain at least 75 percent organic matter that was derived from sphagnum, hypnum, mnium, and/or other mosses, and the remainder must consist of other peat or soil substances normally intermixed with peat in its natural state. The label "peat moss" may be used without these qualifications, if the requirements for "peat" are fulfilled and its composition is conspicuously stated in immediate conjunction with the term "peat moss."

The trade-practice rules also prohibit certain discriminatory practices in pricing, brokerage and commissions; advertising or promotional allowances; and allowances for services and facilities.

The Federal Supply Service, General Services Administration, has developed specifications that are used by all U.S. Government agencies that purchase peat. Federal Specification Q–P–166c (Dec. 17, 1958, amended May 15, 1959) classifies peat and lists the requirements for each type and class. It also supplies pertinent information on sampling, inspection, and testing procedures; packaging and marking requirements; and other related facts.

SCOPE OF REPORT

This is the 26th annual report on the peat industry by the Bureau of Mines. The survey of this industry has been continuous since 1934,

Digitized by Google

when the Bureau of Mines resumed the canvass conducted by the Federal Geological Survey from 1908 to 1926. No data were collected or published between 1926 and 1934.

All statistical data, except where noted, were based upon reports supplied voluntarily by producers. Complete coverage of the industry was attempted, and questionnaires were mailed to all operators who had reported commercial production in the past 3 years. Questionnaires were sent also to all firms that were reported to be possible commercial producers. (Mailing lists are kept current by requesting producers to furnish names and addresses of other producers in their areas and by checking individual State mineral and commodity production reports.) Of the 177 questionnaires mailed in 1959, 104 companies reported commercial production, 17 were temporarily idle, 9 discontinued operations before 1959, and 47 did not reply or stated that they were not peat producers. Of the companies that did not reply, two in Iowa and one in Florida reported production in 1958. Their combined production, however, was only a few thousand tons. Because of the nature of the peat industry, this survey may have failed to reach all producers. The authors feel, however, that all major producers and most smaller ones were canvassed and that the production figures account for most peat produced for commercial sale.

Peat is classified in this report into three general types—moss peat, reed-sedge peat, and peat humus. Moss peat consists of the slightly or moderately decomposed remains of several species of sphagnum, hypnum, and/or other mosses and is normally acid in reaction. Reed-sedge peat is partly decomposed vegetable matter, formed principally from reeds, sedges, and/or other swamp plants in a water-saturated environment; it is slightly acid, neutral, or slightly alkaline in reaction. Humus is humified peat, so decomposed that no plant remains can be identified. Humus is sometimes referred to as muck, but muck generally is disintegrated organic matter that contains more than 40-percent mineral matter. A peat deposit may contain more than one type of peat, and one type may overlap another. Usually, a deposit contains layers of different types of peat that can be excavated separately by controlling the depth of excavation.

Table 4 shows production data on raw and processed peat. Raw peat is peat that has received no processing other than air drying. Processed peat is peat that was shredded, pulverized, and/or kiln-dried. Some peat was cultivated; this is a preparation method in which the surface layer of a peat deposit is turned over periodically before peat is excavated. Cultivation aerates peat and makes it more humified by exposing the undersurface.

Data were collected on the location and size of deposits, types of equipment, quantities produced, quantities processed, quantity and value of sales, major uses, and destination of shipments. These data include only peat produced in the United States; no information was available on the ultimate uses of imported peat. No data were collected on stocks, as most peat is sold as produced. There is a small difference between the quantities produced and sold, because some producers excavate peat 1 year and allow it to cure until the following year. Peat available for consumption was considered to be production plus imports, as only a negligible quantity was exported. All

Digitized by Google

values for domestic peat were based upon producers' selling prices at the operation, excluding containers.

RESERVES

Peat lands in the United States were surveyed by the Federal Geological Survey between 1914 and 1919, and resources were estimated at 13.8 billion tons of air-dried peat. These reserves have remained virtually intact, as less than 0.05 percent of the total has been excavated.

The major peat deposits are in the Northern and the Atlantic Coast regions. Some peat (less than 1 percent of the total) occurs in the Gulf Coast Area, in California, and in the basins of several lakes and rivers in Oregon and Washington. However, the Northern region contains 80 percent of the total reserves.

Although peat occurs in 30 States, about two-thirds of the total is in Minnesota and Wisconsin. These States are in the Northern region; also, Michigan, New York, New Jersey, parts of Ohio, Illinois, Indiana, Iowa, and Pennsylvania. Minnesota deposits of 6.8 billion tons are the most extensive, covering about one-tenth of the total land area of the State. Wisconsin peat lands cover approximately 1 million acres and contain 2.5 billion tons. However, much of the peat in Minnesota and Wisconsin is in water-filled spruce and tamarack swamps and is not readily accessible.

Peat in Minnesota and Wisconsin has formed chiefly in basins that were of glacial origin. These deposits consist of a well-decomposed, black underlayer of fine-grained peat overlain with a slightly decomposed, fibrous, brown layer of builtup peat, formed principally from sphagnum moss.

Extensive deposits of peat, similar to those in Minnesota and Wisconsin, occur in the northern peninsula of Michigan. Many deposits are also present in the southern peninsula; however, they are generally smaller and consist mainly of a more decomposed peat formed from reeds, sedges, grasses, and trees.

Most of the peat deposits in other States of the Northern region, excluding New England, were formed in marshes, lakes, and ponds from reeds, sedges, marsh grasses, and other swamp plants. This peat is more decomposed than the moss peat of Minnesota and Wisconsin; some moss peat occurs in this area, although mosses did not contribute greatly to peat formation in these States.

Peat occurs in all New England States, but four-fifths of the reserves in New England is in Maine. Deposits in Maine are of two types—the filled basin, containing peat similar to that found in Minnesota and Wisconsin, and the climbing bog, consisting of peat formed predominantly from sphagnum moss. Climbing bog deposits occur in the flat or gently sloping coastal and inland areas of eastern and southern Maine. This type of bog is common in Ireland and other parts of northwestern Europe. Peat in these bogs is very fibrous and relatively homogeneous. There are also large deposits in the northern and western parts of the State, but many are situated in heavily forested swamps and are inaccessible. It is estimated that deposits in Maine hold 100 million tons of air-dried peat, of which 48 million tons is readily accessible.

Digitized by Google

All States along the Atlantic coast have peat deposits; about 75 percent of the reserve in this region is in Florida. Peat is found in almost all parts of Florida, which ranks third in total U.S. reserve. The Dismal Swamp in Virginia and North Carolina also contains large peat deposits.

TABLE 2.—Known original reserves of peat in the United States, estimated on an air-dried basis, by regions and States, in thousand net tons [1]

Region and State	Reserves	Region and State	Reserves
Northern region:		Atlantic Coast region:	
Minnesota	6,835,000	Virginia and North Carolina	700,000
Wisconsin	2,500,000	Florida	2,000,000
Michigan	1,000,000	Other States [2]	2,000
Iowa	22,000		
Illinois	10,000	Total	2,702,000
Indiana	13,000		
Ohio	50,000	Other regions:	
Pennsylvania	1,000	Gulf Coast [3]	2,000
New York	480,000	California	72,000
New Jersey	15,000	Oregon and Washington	1,000
Maine	100,000		
New Hampshire	1,000	Total	75,000
Vermont	8,000		
Massachusetts	12,000	Total all regions	13,827,000
Connecticut	2,000		
Rhode Island	1,000		
Total	11,050,000		

[1] Geological Survey, Coal Resources of the United States (Progress Report): Circ. 293, Oct. 1, 1953, p. 38.
[2] Includes Delaware, Maryland, South Carolina, and Georgia.
[3] Excludes Florida.

PRODUCTION

Peat production continued to rise in 1959, reaching 419,460 tons. This quantity was 28 percent above that in 1958 and more than three times the average for 1947–49.

One hundred and four companies in 19 States reported commercial production at 105 operations. Quantities produced in each State varied extensively and ranged from less than 1,000 tons in several States to nearly 200,000 tons in Michigan.

Michigan, with 33 producing companies, led with 46 percent of the total output. Michigan's production was 79 percent greater than 1958, chiefly because 25 additional companies reported output. California, Florida, and Washington, each with 8 percent of the total, ranked next. (California had 5 producing companies, Florida 8, and Washington 10.) New Jersey and Pennsylvania were also substantial producers. The combined production of these six States was 83 percent of the total. Ohio had 11 producing companies but only 1 percent of the total output.

Forty-seven percent of the production was reported as reed-sedge peat, 37 percent as humus, and 16 percent as moss peat. Seventeen percent was raw peat with no preparation other than air drying outdoors. Included was a small percentage of cultivated peat that was sold as excavated after having been air-dried. The remainder was processed by shredding, pulverizing, and/or kiln drying before sale. Ninety-seven percent of the processed peat was shredded and three percent kiln-dried.

Digitized by Google

Except for a few hundred tons harvested by hand in Maine, all peat was excavated by machinery. Production equipment consisted of the following commercial excavating and earth-moving machinery: Power shovels, draglines, front-end loaders, bulldozers, clamshells, dredges, trucks, and belt and bucket loaders. The most prevalent equipment was the front-end loader, 100 of which were used at 69 operations. It is impossible to determine the quantity of peat excavated by any particular type, because some equipment is used for both excavating and loading and most operations have more than one type. Shredders, hammermills, and various grinders and screens were used at 92 operations for shredding peat.

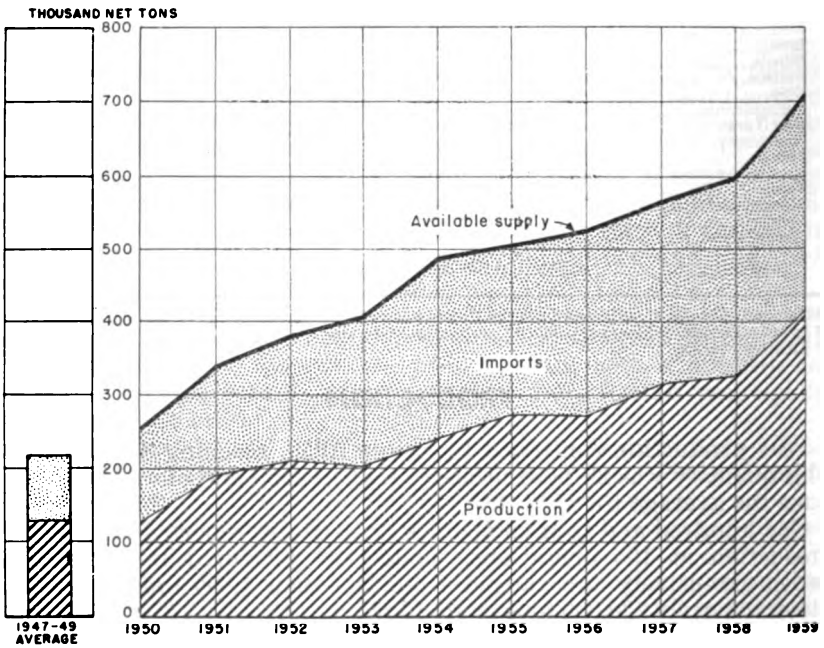

FIGURE 1.—Production, imports, and available supply of peat in the United States, 1950–59.

Digitized by Google

TABLE 3.—Peat produced in the United States, 1958–59, by States

State	1958			1959		
	Number of operations	Net tons	Value	Number of operations	Net tons	Value
California	5	28,617	$373,743	5	34,604	$448,533
Colorado	3	7,143	40,600	3	6,674	35,488
Connecticut	4	1,764	11,255	4	2,090	13,105
Florida	9	36,438	165,123	8	34,446	158,139
Georgia	2	4,491	(1)	2	4,288	(1)
Idaho	1	(1)	(1)	1	(1)	(1)
Illinois	4	11,588	72,495	4	9,117	71,544
Indiana	5	12,106	144,974	5	15,393	202,094
Iowa	3	(1)	(1)			
Maine	1	(1)	(1)	2	(1)	(1)
Massachusetts	1	1,014	(1)	1	773	(1)
Michigan	8	107,342	1,683,980	34	191,661	2,356,656
Minnesota	2	(1)	(1)			
New Hampshire	1	100	(1)	1	25	(1)
New Jersey	3	18,397	184,857	3	28,300	277,920
New York	3	13,606	116,836	3	12,875	138,220
Ohio	8	5,660	103,593	11	5,813	73,270
Pennsylvania	5	23,623	202,718	6	26,948	261,994
South Carolina	1	4,865	(1)	1	4,194	(1)
Washington	11	34,642	115,941	10	32,884	123,586
Wisconsin	1	(1)	(1)	1	7,500	(1)
Undistributed		16,417	229,652		1,875	211,645
Total	81	327,813	3,445,767	105	419,460	4,372,194

[1] Included with "Undistributed" to avoid disclosing individual company figures.

TABLE 4.—Peat produced in the United States in 1959, by kinds, in net tons

Kind	Total			Raw [1]		Processed [2]		Type of processing	
	Quantity	Value		Quantity	Value	Quantity	Value	Shredded	Kiln-dried
		Total	Average						
Moss	65,234	$809,544	$12.41	14,255	$214,447	50,979	$595,097	48,823	2,156
Reed-sedge	197,283	2,699,052	13.68	7,087	60,166	190,196	2,638,886	189,746	450
Humus	156,943	863,598	5.50	51,702	195,317	105,241	668,281	98,741	6,500
Total	419,460	4,372,194	10.42	73,044	469,930	346,416	3,902,264	337,310	9,106

[1] Includes 12,710 tons of cultivated peat.
[2] Includes 130,124 tons of cultivated peat.

CONSUMPTION, USES, AND SHIPMENTS

Domestic production and imports of peat reached record levels in 1959; more peat was available for consumption than in any previous year. Production and imports have increased steadily during the past decade, current consumption being more than three times greater than in 1947–49.

Peat had various uses, but 94 percent of the total was sold for general soil improvement. This peat was used chiefly by homeowners for improving garden soils and mulching and by nurseries and greenhouses for mulching, germinating seeds, and starting cuttings.

Digitized by Google

The second largest use for peat was in potting soils, about 2 percent of the total distributed. For this purpose, peat is mixed with sand or loam, and the mixture is used for growing house plants. Potting soils usually are marketed in small plastic bags and can be purchased in most home and garden or variety stores. Some potting soils were sold by peat producers, but the bulk was sold by companies that purchased peat and mixed and packaged it.

Almost 7,000 tons of dry, finely ground peat was sold by two producers for seed inoculant. Peat was used in this manner as a culture medium for bacteria used to treat leguminous plants. All seed-inoculant peat was kiln-dried and packaged.

Smaller quantities of peat were consumed for various other purposes. Nine producers in five States sold peat for packing flowers and other plants for shipment. This was chiefly bulk reed-sedge peat from New York, Ohio, and Pennsylvania. Four producers sold peat for use in mushroom beds, and two sold peat to firms to add to mixed fertilizers. Smaller amounts were used for earthworm culture and for constructing lawns and golf-course greens.

Domestic peat was sold in 44 States, the District of Columbia, and Canada. Michigan consumed the largest quantities, using 18 percent of all shipments, followed by Pennsylvania with 10 percent and Florida with 9. In addition to being the leading consumer, Michigan was also the leading distributor, shipping peat to 41 States, the District of Columbia, and Canada. Indiana peat had a relatively wide distribution, although the quantities shipped to other States were small. Table 8 shows the destination of peat shipments.

About one-third of all sales was packaged, or about the same percentage as in 1958. The quantity sold packaged in 1959, however, increased 45 percent. Packaged sales have increased steadily since the advent of synthetic films (chiefly polyethylene), which provide inexpensive packaging materials. Domestic peat now is distributed nationally, whereas only a few years ago virtually all of it was consumed within the producing area.

TABLE 5.—Peat sold in the United States in 1959, by uses

Use	In bulk			In packages			Total		
	Net tons	Value		Net tons	Value		Net tons	Value	
		Total	Average		Total	Average		Total	Average
Soil improvement	248,132	$1,620,053	$6.53	130,212	$2,154,161	$16.54	378,344	$3,774,214	$9.98
Potting soils and packing flowers	11,199	(1)	(1)	2,025	(1)	(1)	13,224	131,553	9.95
Seed inoculant				6,950	(1)	(1)	6,950	(1)	(1)
Mushroom beds	2,791	22,673	8.12				2,791	22,673	8.12
Earthworm-culture medium	370	(1)	(1)				370	(1)	(1)
Other [2]	1,931	21,871	11.33				1,931	21,871	11.33
Undistributed		72,792	6.29		135,829	15.13		77,068	10.53
Total	264,423	1,737,389	6.57	139,187	2,289,990	16.45	403,610	4,027,379	9.98

[1] Included with "Undistributed" to avoid disclosing individual company figures.
[2] Includes peat used in mixed fertilizers and on golf course greens.

Digitized by Google

TABLE 6.—Peat sold in the United States in 1959, by kinds, in net tons

Kind	In bulk			In packages			Total		
	Quantity	Value		Quantity	Value		Quantity	Value	
		Total	Average		Total	Average		Total	Average
Moss	42,254	$348,614	$8.25	20,900	$400,595	$19.17	63,154	$749,209	$11.86
Reed-sedge	80,507	712,779	8.85	105,502	1,725,677	16.36	186,009	2,438,456	13.11
Humus	141,662	675,996	4.77	12,785	163,718	12.81	154,447	839,714	5.44
Total	264,423	1,737,389	6.57	139,187	2,289,990	16.45	403,610	4,027,379	9.98

TABLE 7.—Peat sold in the United States, 1958–59, by States

1958

State	In bulk		In packages		Total	
	Net tons	Value	Net tons	Value	Net tons	Value
California	10,625	$68,473	14,315	$227,045	24,940	$295,518
Colorado	7,143	40,600			7,143	40,600
Connecticut	1,614	8,255	150	3,000	1,764	11,255
Florida	35,513	163,273			35,513	163,273
Georgia	3,857	(1)	634	(1)	4,491	(1)
Idaho	(1)	(1)			(1)	(1)
Illinois	10,817	57,076	771	15,425	11,588	72,501
Indiana	8,518	78,921	1,532	30,648	10,050	109,569
Iowa	(1)	(1)			(1)	(1)
Maine			(1)	(1)	(1)	(1)
Massachusetts	1,014	(1)			1,014	(1)
Michigan	35,797	328,093	71,545	1,355,887	107,342	1,683,980
Minnesota	(1)	(1)	(1)	(1)	(1)	(1)
New Hampshire	100	(1)			100	(1)
New Jersey	17,481	166,121	916	18,736	18,397	184,857
New York	7,106	54,736	400	12,000	7,506	66,736
Ohio	4,274	41,573	1,386	62,020	5,660	103,593
Pennsylvania	21,597	165,182	2,026	37,536	23,623	202,718
South Carolina	3,187	(1)	1,678	(1)	4,865	(1)
Washington	33,642	112,041			33,642	112,041
Wisconsin	(1)	(1)	(1)	(1)	(1)	(1)
Undistributed	15,800	171,938	600	57,494	16,406	229,432
Total	218,085	1,456,282	95,959	1,819,791	314,044	3,276,073

1959

California	17,389	$188,720	15,845	$228,435	33,234	$417,155
Colorado	6,674	35,488			6,674	35,488
Connecticut	2,065	12,605	25	500	2,090	13,105
Florida	34,446	158,139			34,446	158,139
Georgia	(1)	(1)	(1)	(1)	4,288	(1)
Idaho	(1)	(1)			(1)	(1)
Illinois	7,706	43,327	1,411	28,217	9,117	71,544
Indiana	10,811	110,454	4,582	91,640	15,393	202,094
Iowa						
Maine			(1)	(1)	(1)	(1)
Massachusetts	773	(1)			773	(1)
Michigan	82,461	465,904	97,408	1,624,638	179,869	2,090,542
Minnesota						
New Hampshire	25	(1)			25	(1)
New Jersey	23,835	217,332	6,748	85,827	30,583	303,159
New York	10,050	86,000	1,516	33,400	11,566	119,400
Ohio	5,348	41,624	450	31,500	5,798	73,124
Pennsylvania	22,131	189,048	1,865	43,343	23,996	232,391
South Carolina	3,470	(1)	724	(1)	4,194	(1)
Washington	32,884	123,586			32,884	123,586
Wisconsin			7,500	(1)	7,500	(1)
Undistributed	4,355	65,162	1,113	122,490	1,180	187,652
Total	264,423	1,737,389	139,187	2,289,990	403,610	4,027,379

[1] Included with "Undistributed" to avoid disclosing individual company figures.

Digitized by Google

TABLE 8.—Destination of peat shipments, 1958–59, in net tons

[Based upon reports from producers showing destination of peat used or sold]

State	1958	1959	State	1958	1959
Alabama	141	258			
Arizona	1,237	1,649	New Hampshire	169	113
Arkansas	217	134	New Jersey	17,093	22,769
California	23,426	32,194	New Mexico	1,022	11,711
Colorado	5,239	3,593	New York	29,084	34,709
Connecticut	2,737	3,296	North Carolina	2,548	2,947
Delaware	635	1,856	Ohio	17,130	27,395
District of Columbia	2,134	2,620	Oklahoma	875	1,028
Florida	35,776	34,867	Oregon	200	230
Georgia	2,299	3,403	Pennsylvania	34,073	39,779
Idaho	1,600	600	Rhode Island	683	1,260
Illinois	15,578	11,600	South Carolina	4,073	2,107
Indiana	6,299	7,043	Tennessee	1,501	2,526
Iowa	6,079	122	Texas	7,554	8,925
Kansas	547	686	Utah	142	538
Kentucky	1,448	3,829	Vermont		25
Louisiana	61	30	Virginia	2,458	3,296
Maine	105	450	Washington	33,784	32,952
Maryland	8,379	10,893	West Virginia	349	1,018
Massachusetts	5,040	3,220	Wisconsin	7,321	7,733
Michigan	31,049	74,458	Wyoming	32	48
Minnesota	1,039				
Missouri	1,899	4,363	Total	313,926	403,420
Montana	49	200	Exported	118	190
Nebraska	151	568			
Nevada	1,271	379	Grand total	314,044	403,610

VALUE AND PRICE

Total value of production increased 27 percent to $4.4 million. Overall unit value, however, was slightly lower than in 1958, because of smaller returns from peat sold in bulk and packages.

Table 4 shows the value of raw and processed peat produced in 1959. All values assigned to production were based upon receipts from commercial sales, f.o.b. plant, as reported by producers. These figures are inconclusive, however, because value depends more upon the amount of processing and whether the peat is sold in bulk or packages, than upon kind of peat. Reed-sedge peat had the highest unit value in 1959, because a much larger quantity was shredded and sold in packages than other types.

Tables 5 and 6 show the value of peat sold in bulk and packages, by producers. The average value per ton for commercial sales was somewhat lower than the overall unit value of production because approximately 16,000 tons of peat with a substantially higher unit value was produced but not sold in 1959. Sixty-six percent of all sales was in bulk at an average price of $6.57 per ton; the remainder was sold in packages at an average of $16.45 per ton. The quantity sold in packages increased 45 percent; however, the value of packaged peat increased only 26 percent, because of a substantial decrease in value of peat sold for general soil improvement.

The total value of imported peat increased 13 percent, chiefly because of increased receipts from Canada. The average value per ton of all imports increased, mainly because of the increased unit value of fertilizer-grade peat, also from Canada. Imported peat has an assigned average value over four times as great as domestic peat, but the values are not comparable owing to differences in marketing levels to which the values are assigned. Values of domestic peat, reported at

Digitized by Google

the producing level, were equivalent to the amount realized by producers from sales; whereas, values of imported peat, established at the port of embarkation, were equal to prices paid by importers, less transportation and miscellaneous charges.

It is difficult to compare foreign and domestic peat on a cost-per-unit basis because of the large variance of moisture in both types; moreover, one is sold by weight, whereas the other is sold by volume. Although other factors are important from the standpoint of use, an important factor regarding the real cost of peat for soil improvement is the dry-organic matter content. The amount of organic matter contained in either foreign or domestic peat generally is not stated on the package.

Retail prices for packaged domestic peat were comparable to those in 1958; peat could be purchased in the Washington, D.C., area for less than $2.00 per 100-pound bag. Retail prices for imported peat also appeared to be comparable to 1958; a 7½-cubic-foot bale could be purchased in the same area for less than $4.00.

TABLE 9.—Average value per ton of peat produced, by kinds, and sold, by uses, 1947–49 (average) and 1955–59

Year	Average value per ton produced			Average value per ton sold	
	Moss	Reed-sedge	Humus	Soil improvement	Other uses
1947–49 (average)	$12.20	$7.64	$6.86	$6.33	$9.15
1955	7.98	11.66	6.33	8.05	9.94
1956	12.55	11.32	5.46	8.32	9.07
1957	12.49	14.07	5.97	10.70	12.26
1958	14.11	14.10	7.01	10.17	12.76
1959	12.41	13.68	5.50	9.98	10.02

FOREIGN TRADE[3]

Imports increased 7 percent over 1958 and were more than three times as great as the average for 1947–49.

Canada was the principal source of imported peat, supplying 62 percent of the total. The remainder was imported from Europe, except for a negligible quantity from Mexico and Japan.

West Germany supplied about one-third of the total U.S. imports, and four-fifths of the peat shipped from Europe. Netherlands supplied 8 percent of the European shipments and Poland and Denmark, 5 percent each. Small quantities were imported from four other European countries. Imports from Europe decreased approximately 13,000 tons, a decline of 10 percent.

All imported peat was moss peat and was classified by the Bureau of the Census into two grades: "Poultry and Stable" and "Fertilizer." Data are not available on end uses; generally, Poultry and Stable grade was used for litter, whereas Fertilizer grade was used for soil improvement. Of the imports, 97 percent was Fertilizer grade, which

[3] Figures on imports compiled by Mae B. Price and Elsie D. Jackson, Division orf Foreign Activities, Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.

Digitized by Google

entered the United States duty free. A duty of $0.25 per long ton was levied on Poultry and Stable grade.

Ninety-eight percent of Canada's estimated production was shipped to the United States, chiefly as Fertilizer-grade peat. Most Canadian peat is pressed into bales, covered with burlap, and bound with wooden slats and wire. These bales usually measure 12 cubic feet and weigh 100 to 150 pounds. Some peat is packaged in heavy fiber-board containers that hold about 100 pounds. Canadian peat is produced in three grades: (1) Coarse, for use as stable litter; (2) medium, for poultry and small animal litter; and (3) fine, for soil conditioner, packing, and insulation. Most of the peat imported from Canada was produced in British Columbia and entered the United States through the Washington customs district.

Peat imported from West Germany usually is packaged in burlap-covered bales and is similar in quality to that shipped from Canada. Ninety-seven percent of the German imports was Fertilizer-grade peat, which entered the United States through the New York, Philadelphia, and Florida customs districts and probably was consumed within these areas.

TECHNOLOGY

Most research on peat is conducted in Europe, where it is considered an important natural resource and large quantities are used for soil improvement and fuel. Many European countries have developed their peat industry to a high degree; several have furthered technology by devoting special institutes to peat research and development and the training of peat engineers and technicians.

The U.S.S.R. has several large peat institutions and research stations conducting separate specialized programs, which range from studies to develop new methods of extraction to problems on chemical technology, coking, and gasification. In 1959 Soviet engineers developed a new process[4] for using freshly-cut sod peat in boilers. Although dry, milled peat was used mostly for steam generation in the U.S.S.R., a large quantity of the more costly sod peat also was used. The new process consists of drying freshly cut peat bricks by staturating them with superheated steam in a dry-heat furnace, then passing the dry peat into a boiler fireroom where it is used for low-B.t.u. fuel. The process requires 10 to 15 minutes and is reported to be the most economical method developed for burning sod peat.

In Germany the Torfinstitut, a government agency for peat research, has engaged in a program designed to develop better methods for drying and briquetting peat and for producing peat coke. In recent years peat coke has partly replaced charcoal, which is used in some blast furnaces, and demand for peat coke is increasing. Three plants, equipped with continuously operating retorts are producing 25,000 tons of peat coke annually at a carbonizing temperature of 500° to 700° C. The institute has made studies on coke quality using different methods of heating the retorts and has attempted to develop processes for automatic stoking with peat

[4] Power, *Soviets Use Fresh Peat in Boilers;* Vol. 104, Apr. 1960, p. 210.

Digitized by Google

TABLE 10.—Peat moss imported for consumption in the United States, 1957–59, by kinds and by countries

[Bureau of the Census]

Country	Poultry and stable grade		Fertilizer grade		Total	
	Net tons	Value	Net tons	Value	Net tons	Value
1957						
North America:						
Canada	6,060	$432,749	111,927	$6,242,104	117,987	$6,674,853
Mexico	40	2,069			40	2,069
Total	6,100	434,818	111,927	6,242,104	118,027	6,676,922
Europe:						
Belgium-Luxembourg			60	1,956	60	1,956
Czechoslovakia			43	1,120	43	1,120
Denmark			5,120	239,277	5,120	239,277
Finland			74	3,420	74	3,420
France			327	19,843	327	19,843
Germany, West	4,227	149,912	107,322	3,752,576	111,549	3,902,488
Ireland			1,007	38,763	1,007	38,763
Netherlands	62	2,538	7,054	263,472	7,116	266,010
Poland and Danzig			1,869	60,500	1,869	60,500
Sweden			644	36,746	644	36,746
United Kingdom			865	38,526	865	38,526
Total	4,289	152,450	124,385	4,456,199	128,674	4,608,649
Asia: Japan			58	1,918	58	1,918
Grand total	10,389	[1] 587,268	236,370	[1] 10,700,221	246,759	[1] 11,287,489
1958						
North America:						
Canada	6,220	460,597	141,651	7,209,825	147,871	7,670,422
Mexico	9	255			9	255
Total	6,229	460,852	141,651	7,209,825	147,880	7,670,677
Europe:						
Belgium-Luxembourg			30	1,500	30	1,500
Denmark			5,897	274,897	5,897	274,897
Germany, West	3,828	131,263	96,332	3,308,009	100,160	3,439,272
Ireland			1,334	46,270	1,334	46,270
Netherlands	196	7,551	8,447	346,584	8,643	354,135
Poland and Danzig			3,416	134,368	3,416	134,368
Portugal			54	2,400	54	2,400
Sweden			492	32,759	492	32,759
United Kingdom	12	416	1,048	66,459	1,060	66,875
Total	4,036	139,230	117,050	4,213,046	121,086	4,352,276
Asia: Japan	7	1,448	123	10,272	130	11,720
Grand total	10,272	601,530	258,824	11,433,143	269,096	12,034,673
1959						
North America:						
Canada	6,340	450,472	171,785	8,975,697	178,125	9,426,169
Mexico	19	527			19	527
Total	6,359	450,999	171,785	8,975,697	178,144	9,426,696
Europe:						
Belgium-Luxembourg			47	1,410	47	1,410
Denmark			5,354	232,665	5,354	232,665
France			42	1,634	42	1,634
Germany, West	3,025	107,692	85,031	3,143,205	88,056	3,250,897
Netherlands	295	15,230	8,808	368,347	9,103	383,577
Poland and Danzig			5,500	249,925	5,500	249,925
Sweden	25	1,024	12	640	37	1,664
United Kingdom			399	27,549	399	27,549
Total	3,345	123,946	105,193	4,025,375	108,538	4,149,321
Asia: Japan	9	2,250	28	1,831	37	4,081
Grand total	9,713	577,195	277,006	13,002,903	286,719	13,580,098

[1] Data known to be not comparable with other years.

Digitized by Google

TABLE 11.—Peat moss imported for consumption in the United States in 1959, by kinds and by customs districts

[Bureau of the Census]

Customs district	Poultry and Stable grade		Fertilizer grade		Total	
	Net tons	Value	Net tons	Value	Net tons	Value
Buffalo	63	$2,380	21,033	$909,245	21,096	$911,625
Chicago			27	450	27	450
Dakota	2,954	230,435	14,652	963,151	17,606	1,193,586
Duluth and Superior	490	22,864	2,548	119,253	3,038	142,117
Florida	83	2,800	10,153	331,348	10,236	334,148
Galveston			1,959	68,849	1,959	68,849
Georgia	17	594	652	18,699	669	19,293
Hawaii	9	2,250	3	304	12	2,554
Laredo	19	527	72	2,717	91	3,244
Los Angeles	98	3,210	5,014	207,522	5,112	210,732
Maine and New Hampshire	22	830	2,029	107,134	2,051	107,964
Maryland	254	9,372	10,521	411,408	10,775	420,780
Massachusetts	10	325	5,472	212,478	5,482	212,803
Michigan	637	29,827	20,054	908,515	20,691	938,342
Mobile			4,666	167,446	4,666	167,446
New Orleans	837	26,061	6,549	243,321	7,386	269,382
New York	1,123	51,968	39,422	1,636,738	40,545	1,688,706
North Carolina	45	1,349	406	19,451	451	20,800
Oregon	12	262	474	24,707	486	24,969
Philadelphia	373	12,624	13,037	413,826	13,410	426,450
Puerto Rico			109	6,928	109	6,928
Sabine			18	576	18	576
St. Lawrence	109	3,486	10,513	446,750	10,622	450,236
San Francisco	51	1,611	1,291	47,961	1,342	49,572
South Carolina			726	26,757	726	26,757
Vermont	192	7,193	20,951	705,911	21,143	713,104
Virginia	442	13,770	4,568	182,958	5,010	196,728
Washington	1,873	153,457	80,087	4,818,500	81,960	4,971,957
Total	9,713	577,195	277,006	13,002,903	286,719	13,580,098

The Japanese Government and two private Japanese firms have financed a company to process peat into a new type of industrial coke called Coalite. Details are not available, but the patented process uses a newly invented method of removing moisture and noncombustibles from peat by mechanical means.

Peat resources in the United States have not been developed, because adequate supplies of more desirable fuels and chemical raw materials are readily available. Some peat is used for other purposes, but the quantities are small. The bulk is used as excavated except for minor processing. Hence, only limited effort has been devoted to peat research in the United States.

The Bureau of Mines [5] made several economic studies years ago on the potential of peat as a source of energy but concluded that peat could not compete economically with other mineral fuels, except in local areas.

The State of Minnesota has conducted a comprehensive research program on peat since 1954. Long hampered in industrial development because it lacks other natural fuels, Minnesota has attempted to develop its vast peat resources as a source of energy and chemical raw materials that would compete locally with the fuels Minnesota purchases from other States. In 1954 the Office of Iron Range Resources

[5] Davis, Charles A., The Uses of Peat for Fuel and Other Purposes: Bureau of Mines Bull. 16, 1911, 214 pp.
Odell, W. W. and Hood, O. P., Possibilities for the Commercial Utilization of Peat: Bureau of Mines Bull. 253, 1926, 160 pp.

Digitized by Google

TABLE 12.—Peat moss imported from Canada and West Germany in 1959, by kinds and customs districts

[Bureau of the Census]

Customs districts	Canada				West Germany			
	Poultry and Stable grade		Fertilizer grade		Poultry and Stable grade		Fertilizer grade	
	Net tons	Value	Net tons	Value	Net tons	Value	Net tons	Value
Buffalo	63	$2,380	21,033	$909,245				
Chicago							27	$450
Dakota	2,954	230,435	14,652	963,151				
Duluth and Superior	490	22,864	2,548	119,253				
Florida					83	$2,800	9,281	298,872
Galveston			44	1,400			1,596	58,067
Georgia					17	594	608	17,895
Hawaii			3	304				
Los Angeles					98	3,210	3,176	134,481
Maine and New Hampshire	22	830	2,029	107,134				
Maryland					254	9,372	8,165	317,034
Massachusetts			40	2,242	10	325	3,798	128,038
Michigan	637	29,827	19,971	905,446			83	3,069
Mobile							4,595	164,624
New Orleans					819	25,447	5,373	193,010
New York					821	36,328	32,575	1,293,460
North Carolina					45	1,349	289	14,394
Oregon					12	262	209	7,031
Philadelphia					373	12,624	9,068	273,622
Puerto Rico							109	6,928
Sabine							18	576
St. Lawrence	109	3,486	10,513	446,750				
San Francisco					51	1,611	1,221	46,194
South Carolina							586	21,564
Vermont	192	7,193	20,951	705,911				
Virginia					442	13,770	4,196	162,088
Washington	1,873	153,457	80,001	4,814,861			58	1,808
Total	6,340	450,472	171,785	8,975,697	3,025	107,692	85,031	3,143,205

and Rehabilitation, a State agency, established a "Chemical Products from Peat Project" at the University of Minnesota. The purpose was to develop basic knowledge of the peats of Minnesota from the standpoint of eventual economic use. The project has been continuous, and research programs have included both basic and applied research. Research has ranged from studies on the chemical and physical properties of Minnesota peats to technical studies, such as the use of peat for taconite binder. Investigations also have been conducted on new applications of peat to agriculture and horticulture.

WORLD REVIEW [6]

World peat production in 1959 was estimated at 70.6 million tons (table 13), an 8-percent increase over estimated production in 1958. Ninety-nine percent was produced in Europe; the remainder came from Canada, Israel, Japan, Korea, and the United States.

The U.S.S.R. was the largest producer with an estimated output of 61 million tons for fuel purposes. Recently developed data [7] show

[6] Figures on world production compiled by Pearl J. Thompson and Berenice B. Mitchell, Division of Foreign Activities, Bureau of Mines.

[7] Antonov, V. Ya., and others, Obshchiy Kurs Teknologii Torfodobyvaniya (A General Course in the Technology of Peat Production): Gosenergoizdat, Moscow, 1959, p. 300. Torfyanaya Promyshlennost', Gosenergoizdat, Za Dal'neyshiy Progress Torfyanoy Promyshlennosti (For Further Progress in the Peat Industry): Moscow, January 1959, p. 4.

Digitized by Google

that Soviet Russia produced an additional quantity, approximately equal to that produced for energy, for litter and agricultural use; this output was not included in table 13, as comparable data for other years were not available. The Soviet Union has extensive peat reserves (estimated at 174 billion tons of air-dried peat, or 60 percent of the world total),[8] and peat has long been used in certain areas as a source of energy. Data on the use of peat were not available for 1959, but 61 million net tons of peat was consumed for energy in 1957 as follows:[9] Electric powerplants, 24 million tons; other industrial plants, 19 million tons; gas generator plants, 6 million tons; fuel briquets, 2 million tons; and other energy uses, 10 million tons. The U.S.S.R. has numerous peat-fired power-generating stations, which produce an estimated 6 to 8 percent of the total electric power generated in the Soviet Union. Peat also was used for manufacturing industrial gases and for industrial and residential heating. A large part of the peat used as domestic fuel was in the form of briquets. Soviet plans for 1965 [10] call for an output of 78 million tons of peat for fuel and 158 million tons for litter, fertilizers, and general soil improvement. About 90 percent of the agricultural and litter peat will be used for soil improvement; the remainder will be used for poultry and stable litter. Projected production of peat briquets [11] for all uses in 1965 is 4.3 million tons; most will be consumed for residential heating and cooking.

Ireland ranked second in production with 4.8 million tons, 7 percent of the world total. With only meager reserves of other fuels, Ireland has used peat for many years as a domestic fuel; in recent years large quantities have been burned in industrial plants, chiefly for generating electric power. In 1958, seven peat-fired power stations generated more than one-third of the total electric power output. Substantial quantities of milled peat were briquetted in 1959, and two briquet factories are now being constructed. Peat briquets were used mainly for residential and industrial heating.

West Germany produced 1.7 million tons of peat, slightly less than half was used for fuel. Germany used some peat for electric-power generation and substantial quantities for domestic heating, but 880,000 tons were produced for agricultural and farm use; 10 percent was exported to the United States.

East Germany, Netherlands, Denmark, United States, and Poland ranked next in production, but their combined output was only 3 percent of the total. The United States produced 0.6 percent of the total peat and ranked seventh in world production.

---

[8] Bausin, A. F., and others, 40 Let Torfyanoy Promyshlennosti SSSR (Forty Years of the USSR Peat Industry), Gosenergoizdat, Moscow: 1957, p. 15.

[9] Strukov, B. I., K 41-Y Godovshchine Velikoy Oktyabr'skoy Sotsialisticheskoy Revolyutsii (The Peat Industry on the 41st Anniversary of the October Socialist Revolution), Torfyanaya Promyshlennost', Gosenergoizdat, Moscow: 1958, No. 7, pp. 1–4.

[10] See footnote 5, p. 15.

[11] Antonov, V. Ya., and others, Obshchiy Kurs Teknologii Torfodobyvaniya (A General Course in the Technology of Peat Production), Gosenergoizdat, Moscow: 1959, pp. 11–12.

Digitized by Google

TABLE 13.—World production of peat, 1955–59, by countries, in thousand net tons [1]

Country	1955	1956	1957	1958	1959
Austria, fuel [2]	45	45	45	45	40
Canada, agricultural use [3]	118	128	138	149	181
Denmark	785	778	809	424	463
Finland:					
Agricultural use	[2] 9	[2] 19	[2] 19	8	6
Fuel	176	158	208	150	160
France:					
Agricultural use	33	45	[2] 45	[2] 22	[2] 28
Fuel	2	6	[2] 6	[2] 3	[2] 3
Germany:					
East [2]	550	550	550	550	550
West:					
Agricultural use	492	659	780	819	[2] 880
Fuel	1,153	1,005	808	649	772
Hungary [2]	65	65	65	65	65
Ireland:					
Agricultural use	10	9	14	10	[2] 11
Fuel	3,937	4,006	4,375	2,491	4,805
Israel, agricultural use	43	42	22	[2] 28	[2] 44
Japan [2]	75	75	80	80	80
Korea, Republic of	448	288	269	141	[2] 140
Netherlands [2]	500	500	500	500	500
Norway:					
Agricultural use	31	29	28	[2] 33	[2] 33
Fuel	263	263	[2] 260	64	66
Poland	718	729	400	[2] 400	[2] 400
Sweden:					
Agricultural use	71	82	80	71	[2] 70
Fuel	287	275	314	281	[2] 275
U.S.S.R., fuel	56,000	49,400	60,500	58,200	[2] 60,600
United States, agricultural use	274	292	316	328	419
World total [2] [4]	66,090	59,450	70,630	65,510	70,600

[1] Includes revisions of data published previously. Data do not add to totals shown because of rounding.
[2] Estimated.
[3] In addition, Canada produced a negligible quantity of peat fuel.
[4] Iceland, Italy, and Spain produced a negligible quantity of peat fuel.

Digitized by Google

Digitized by Google

B. Petroleum and Related Products

Carbon Black

By Ivan F. Avery and Lulie V. Harvey

Contents

	Page		Page
General summary	283	Stocks	289
Scope of report	284	Value	289
Production	284	Foreign trade	291
Consumption and uses	288	World production	293

GENERAL SUMMARY

OUTPUT of carbon black in 1959 increased in all producing States except New Mexico. The national increase was 20 percent. Domestic sales and exports increased 22 percent and 16 percent, respectively, resulting in a 21 percent gain in sales. Sales to the rubber industry, which purchased 95 percent of the domestic output of carbon black, increased 23 percent. Sales to all other major consumers also increased. Stocks decreased 82 million pounds during the year.

TABLE 1.—Salient statistics of carbon black produced from natural gas and liquid hydrocarbons in the United States, 1955–59, in thousand pounds

	1955	1956	1957	1958	1959
Production:					
Channel process	359,487	363,672	357,557	324,743	321,030
Furnace processes	1,384,025	1,476,296	1,440,868	1,319,862	1,646,497
Total	1,743,512	1,839,968	1,798,425	1,644,605	1,967,527
Shipments:					
Domestic sales	1,373,777	1,303,029	1,331,366	1,250,937	1,532,249
Exports	454,181	425,328	459,671	440,542	513,143
Total	1,827,958	1,728,357	1,791,037	1,691,479	2,045,392
Losses	15	961	5,563	1,602	4,165
Stocks of producers, Dec. 31	236,925	347,574	349,399	300,923	218,893
VALUE					
Production.....thousand dollars	117,587	120,252	127,979	115,042	137,983
Average per pound.....cents	6.74	6.53	7.12	7.00	7.01

Digitized by Google

SCOPE OF REPORT

Carbon black is a very pure grade of quasi-graphitic carbon, with particle diameters ranging from 50 to 5,000 angstrom units.

Annual reports were submitted to the Bureau of Mines by operators of all commercial plants in the United States.

Monthly figures are based on reports prepared by the National Gas Products Association and are adjusted to agree with the annual reports received by the Bureau of Mines.

Import and export data are compiled by the Bureau of the Census, U.S. Department of Commerce.

Statistics are obtained on both furnace and channel blacks. Furnace blacks are reported in eight grades: Semireinforcing Furnace (SRF), High-Modulus Furnace (HMF), General-Purpose Furnace (GPF), Fast-Extrusion Furnace (FEF), High-Abrasion Furnace (HAF), Superabrasion Furnace (SAF), Intermediate-Abrasion Furnace (ISAF), and Thermal. Production and uses of the various grades are described in Minerals Yearbook, 1948 and 1949.

PRODUCTION

Number and Capacity of Plants.—There were no changes in number of plants operating in 1959. Existing plants, however, increased total capacity by 128,000 pounds per day during the year.

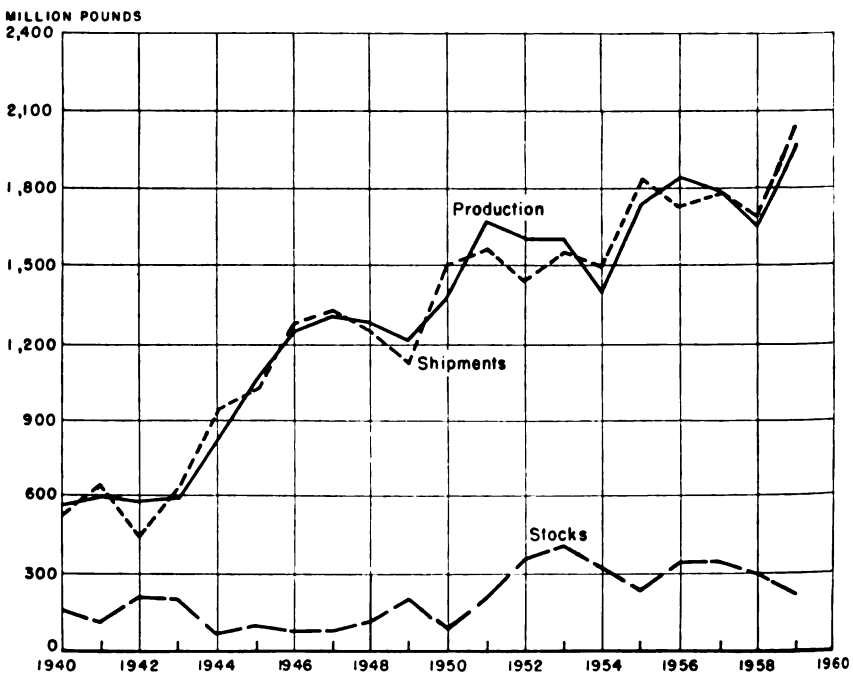

FIGURE 1.—Production, stocks, and shipments of carbon black, 1940–59.

Digitized by Google

Method and Yield.—The 1959 production of furnace black increased 25 percent and channel black decreased 1 percent, resulting in an overall increase of 20 percent over 1958 production. In 1959, 165,997 million cubic feet of natural gas was consumed as feed to produce 321,030 thousand pounds of channel black—a yield of 1.93 pounds per thousand cubic feet, compared with a yield of 1.99 pounds in 1958. Furnace-black plants consumed as feed 48,615 million cubic feet of natural gas, producing 389,508 thousand pounds, a yield of 8.01 pounds per thousand cubic feet. In addition, 297,639 thousand gallons of hydrocarbon liquids feed was consumed to produce 1,256,989 thousand pounds of furnace black—a yield of 4.22 pounds per gallon, compared with 4.09 pounds in 1958.

TABLE 2.—Carbon black produced from natural gas and liquid hydrocarbons in the United States, 1955–59, by States and districts, in thousand pounds

State and district	1955	1956	1957	1958	1959	Change from 1958 (percent)
Louisiana	502,793	537,723	533,847	502,742	599,523	19
Texas:						
Panhandle district	545,060	574,234	544,068	474,564	572,157	21
Rest of State	406,416	414,795	415,455	369,831	450,639	22
Total Texas	951,476	989,029	959,523	844,395	1,022,796	21
Other States	289,243	313,216	305,055	297,468	345,208	16
Grand total	1,743,512	1,839,968	1,798,425	1,644,605	1,967,527	20

Digitized by Google

TABLE 3.—Carbon black produced in the United States, 1959, by States and districts, and natural gas and liquid hydrocarbons used in its manufacture

	Producers reporting [1]	Number of plants	Production					
			Furnace black			Channel black		
			Thousand pounds	Value at plant		Thousand pounds	Value at plant	
				Total (thousand dollars)	Cents per pound		Total (thousand dollars)	Cents per pound
Louisiana	6	9	599,449	39,474	6.59	(2)	(2)	(2)
Texas:								
Panhandle district	7	12	476,859	31,593	6.63	95,298	10,701	11.23
Rest of State	5	11	316,364	20,524	6.49	134,349	11,488	8.55
Total Texas	8	23	793,223	52,117	6.57	229,647	22,189	9.66
Arkansas	1	1						
Oklahoma	1	1	230,302	15,594	6.77	-------	-------	-------
California	1	1						
Kansas	2	2						
New Mexico	3	4	23,523	1,189	5.05	91,383	7,361	8.06
Grand total:								
1959	11	41	1,646,497	108,374	6.58	321,030	29,550	9.20
1958	11	41	1,319,862	86,955	6.59	324,743	27,786	8.56

	Natural gas used					Liquid hydrocarbons used			
	Million cubic feet	Average yield [3] (pounds per M cubic feet)		Value		Thousand gallons	Average yield (pounds per gallon)	Value	
		Furnace	Channel	Total (thousand dollars)	Average (cents per M cu.ft.)			Total (thousand dollars)	Average (cents per gallon)
Louisiana	22,954	9.17	-------	2,472	10.78	87,919	4.43	6,816	7.75
Texas:									
Panhandle district	66,319	7.21	1.80	6,029	9.09	101,593	3.75	6,057	5.96
Rest of State	70,380	1.00	2.06	6,408	9.10	66,195	4.87	4,432	6.13
Total Texas	136,699	5.47	1.94	12,437	9.10	167,788	4.13	10,489	6.25
Arkansas									
Oklahoma									
California	4,946	11.09	-------	1,026	20.74	41,932	4.18	2,743	6.54
Kansas									
New Mexico	50,013	10.30	1.91	3,777	7.55	-------	-------	-------	-------
Grand total:									
1959	214,612	8.01	1.93	19,712	9.19	297,639	4.22	20,048	6.74
1958	211,048	7.81	1.99	17,805	8.44	231,057	4.09	15,689	6.79

[1] Detail will not add to totals because some producers operate in more than 1 area.
[2] Included with Texas: Rest of State to avoid disclosure.
[3] Partly estimated.

Digitized by Google

TABLE 4.—Production and shipments of carbon black in the United States in 1959, by months and grades, in thousand pounds

PRODUCTION [1]

Month	Furnace									Channel	Total
	SRF [2]	HMF [3]	GPF [4]	FEF [5]	HAF [6]	SAF [7]	ISAF [8]	Thermal	Total		
January	22,951	6,458	4,997	21,622	39,181	298	16,549	12,236	124,292	26,884	151,176
February	21,718	5,147	5,542	19,325	37,957	-------	17,432	11,723	118,844	24,691	143,535
March	23,055	5,669	6,939	23,419	46,614	-------	19,197	12,519	137,412	28,023	165,435
April	22,905	6,781	7,932	21,726	43,390	-------	19,704	14,351	136,789	27,619	164,408
May	23,674	5,389	8,719	20,967	45,134	1,688	18,304	14,501	138,376	27,746	166,122
June	22,873	6,017	7,845	20,998	38,761	3,367	16,311	13,931	130,103	26,341	156,444
July	25,548	7,289	7,619	21,326	44,494	630	21,063	13,545	141,514	27,071	168,585
August	22,994	7,129	9,377	21,585	45,863	4	21,498	14,422	142,872	27,490	170,362
September	28,082	6,739	7,453	20,938	45,437	663	20,426	12,965	142,703	26,281	168,984
October	29,345	5,531	6,810	19,762	43,977	2,115	21,662	13,372	142,574	26,472	169,046
November	26,131	6,052	6,529	19,896	42,880	1,126	21,442	12,692	136,748	25,303	162,051
December	30,412	7,565	8,020	18,484	50,323	630	23,552	15,284	154,270	27,109	181,379
Total	299,688	75,766	87,782	250,048	524,011	10,521	237,140	161,541	1,646,497	321,030	1,967,527

SHIPMENTS (INCLUDING EXPORTS) [9]

January	26,068	6,290	7,014	24,399	45,806	573	17,360	12,326	139,836	31,773	171,609
February	25,829	5,018	7,283	20,829	42,896	544	16,709	12,703	131,811	28,151	159,962
March	29,260	6,172	7,437	25,831	47,168	836	19,824	14,956	151,484	29,142	180,626
April	24,076	5,775	8,380	19,486	40,681	516	18,900	13,270	131,084	24,393	155,477
May	20,866	5,632	8,420	17,479	32,242	882	19,099	12,357	116,977	26,321	143,298
June	23,485	5,939	8,134	20,895	43,367	1,439	19,921	14,155	137,335	25,511	162,846
July	25,626	7,303	8,946	22,761	49,890	886	23,358	12,342	151,112	29,135	180,247
August	26,625	6,446	6,817	22,063	47,659	1,069	21,013	14,292	145,984	26,133	172,117
September	30,834	7,788	7,186	23,967	52,014	982	23,429	15,696	161,896	35,401	197,297
October	27,058	5,813	7,891	20,360	45,232	983	22,856	13,744	143,937	26,847	170,784
November	27,530	7,185	7,092	21,159	43,447	1,388	22,902	13,897	144,600	33,411	178,011
December	27,905	7,999	7,917	18,932	46,335	682	23,176	14,279	147,225	30,058	177,283
Total	315,162	77,360	92,517	258,161	536,737	10,780	248,547	164,017	1,703,281	346,276	2,049,557

[1] Compiled from reports of the National Gas Products Association and of producing companies not included in association figures. Figures adjusted to agree with annual reports of individual producers.
[2] Semireinforcing Furnace. [3] High-Modulus Furnace. [4] General-Purpose Furnace.
[5] Fast-Extrusion Furnace. [6] High-Abrasion Furnace. [7] Superabrasion Furnace.
[8] Intermediate-Abrasion Furnace. [9] Includes losses.

TABLE 5.—Natural gas and liquid hydrocarbons used in manufacturing carbon black in the United States and average yield, 1955–1959

	1955	1956	1957	1958	1959
Natural gas used.....million cubic feet	244,794	242,598	233,788	211,048	214,612
Average yield of carbon black per thousand cubic feet.....pounds	3.58	3.56	3.40	3.32	3.31
Average value of natural gas used per thousand cubic feet.....cents	7.92	7.68	8.26	8.44	9.19
Liquid hydrocarbons used.....thousand gallons	221,101	242,406	240,413	231,057	297,639
Average yield of carbon black per gallon.....pounds	3.92	4.03	4.18	4.09	4.22
Average value of liquid hydrocarbons used per gallon.....cents	6.19	6.79	7.36	6.79	6.74
Number of producers reporting	11	11	12	11	11
Number of plants	42	42	42	41	41

Digitized by Google

TABLE 6.—Number and capacity of carbon-black plants operated in the United States, 1958–59

State or district	County or parish	Number of plants				Total daily capacity (pounds)	
		1958		1959		1958	1959
		Channel	Furnace	Channel	Furnace		
Texas: Panhandle district	Carson	1	------	1	------	1,639,000	1,660,000
	Gray	3	1	3	1		
	Hutchinson	1	4	1	4		
	Moore	------	1	------	1		
	Wheeler	------	1	------	1		
Total Panhandle district		5	7	5	7	1,639,000	1,660,000
Rest of State	Aransas	1	1	1	1	1,277,100	1,335,000
	Brazoria	1	------	1	------		
	Brooks	1	------	1	------		
	Ector	1	------	1	------		
	Gaines	1	------	1	------		
	Harris	------	1	------	1		
	Howard	------	1	------	1		
	Montgomery	------	1	------	1		
	Terry	------	1	------	1		
	Winkler	1	------	1	------		
Total rest of State		6	5	6	5	1,277,100	1,335,000
Total Texas		11	12	11	12	2,916,100	2,995,000
Louisiana	Avoyelles	------	1	------	1	1,650,800	1,696,300
	Calcasieu	------	1	------	1		
	Evangeline	------	1	------	1		
	Ouachita	------	2	------	2		
	Richland	1	------	1	------		
	St. Mary	------	3	------	3		
Total Louisiana		1	8	1	8	1,650,800	1,696,300
Arkansas	Union	------	1	------	1	717,000	737,000
California	Contra Costa	------	1	------	1		
Kansas	Grant	------	2	------	2		
Oklahoma	Kay	------	1	------	1		
New Mexico	Lea	3	1	3	1	348,000	332,000
Total United States		15	26	15	26	5,631,900	5,760,300

CONSUMPTION AND USES

Domestic sales of carbon black increased 22 percent in 1959. Average loading of carbon black in virgin rubber increased from 853 pounds per long ton in 1958 to 878 pounds in 1959, in line with the continuing decline in the proportion of natural rubber used, which requires a lower loading than does synthetic rubber. This calculation is based on total consumption of all virgin rubber. In 1959, natural rubber comprised 34 percent of the virgin rubber consumption, compared with 36 percent in 1958.

The demand for carbon black for use in paints and ink increased 26 and 17 percent, respectively, from 1958. Steel and chemical plants consumed much of the carbon black reported in the miscellaneous category. Actual consumption for these uses cannot be disclosed.

Digitized by Google

TABLE 7.—Sales of carbon black for domestic consumption in the United States, 1955–59, by uses, in thousand pounds

Use	1955	1956	1957	1958	1959	Change from 1958 (percent)
Rubber	1,286,861	1,244,651	1,271,562	1,192,162	1,463,239	23
Ink	55,313	42,047	43,153	40,645	47,366	17
Paint	13,661	13,231	11,951	10,997	13,828	26
Miscellaneous	17,942	3,100	4,700	7,133	7,816	10
Total	1,373,777	1,303,029	1,331,366	1,250,937	1,532,249	22

STOCKS

Total stocks decreased 82 million pounds in 1959. Stocks of furnace black decreased 56.8 million pounds and channel black decreased 25.2 million pounds. Declines were reported in stocks of all grades of furnace black.

TABLE 8.—Producers' stocks of channel- and furnace-type blacks in the United States, Dec. 31, 1955–59, in thousand pounds

Year	Furnace									Channel	Total
	SRF [1]	HMF [1]	GPF [1]	FEF [1]	HAF [1]	SAF [1]	ISAF [1]	Thermal	Total		
1955	19,680	17,554	--------	25,065	53,582	(2)	[2] 14,108	[3] 9,561	139,550	97,374	236,924
1956	78,552	16,500	--------	35,374	69,253	(2)	[2] 47,081	[3] 22,270	269,030	78,544	347,574
1957 [4]	75,282	12,336	(3)	35,135	60,242	(2)	[2] 56,118	[3] 28,270	267,383	82,016	349,399
1957 [5]	75,282	10,704	1,632	35,135	60,242	6,241	49,877	[3] 28,270	267,383	82,016	349,399
1958	40,391	6,351	8,867	26,526	53,007	7,045	40,451	23,276	205,914	95,009	300,923
1959	24,917	4,757	4,132	18,413	40,281	6,786	29,044	20,800	149,130	69,763	218,893

[1] For explanation, see footnotes to table 4.
[2] SAF included in ISAF.
[3] Includes a small amount of other furnace grades before 1957.
[4] Old basis, for comparison with previous years.
[5] Included in HMF.
[6] New basis, for comparison with 1958.

VALUE

Prices of carbon black in carlots, f.o.b. plants, as compiled by the Oil, Paint and Drug Reporter remained unchanged in 1959. The average value of channel black at plants increased sharply from an average of 8.56 cents per pound in 1958 to 9.20 cents in 1959. Furnace black average price remained about the same as in 1958. Value of natural gas used as raw material in 1959 increased from the average of 8.44 cents per thousand cubic feet to 9.19 cents. Liquid hydrocarbon feed average values continued to decline from 6.79 cents per gallon to 6.74 cents in 1959.

Digitized by Google

TABLE 9.—Prices of carbon black in carlots, f.o.b. plant, 1955–59, in cents per pound

[Oil, Paint and Drug Reporter]

Date	Channel blacks		Furnace blacks			
	Ordinary rubber grades [1]		Semi-reinforcing grades (SRF)	High-Modulus grades (HMF)	Fast-Extrusion grades (FEF)	High-Abrasion grades (HAF)
	Bags	Bulk	Bags	Bags	Bags	Bags
Jan. 1, 1955	7.40	7.00	4.50	5.50	6.00	7.90
Jan. 1, 1956	7.40	7.00	4.50	5.50	6.00	7.90
Jan. 1, 1957	7.40	7.00	4.50	5.50	6.00	7.90
Dec. 9, 1957	7.75	7.25	5.75	6.25	6.75	7.75
Dec. 29, 1958	7.75	7.25	5.75	6.25	6.75	7.75
Dec. 28, 1959	7.75	7.25	5.75	6.25	6.75	7.75

[1] Chiefly Easy-Processing (EPC) and Medium-Processing (MPC), but also includes Hard-Processing (HPC) and Conductive (CC) channel blacks.

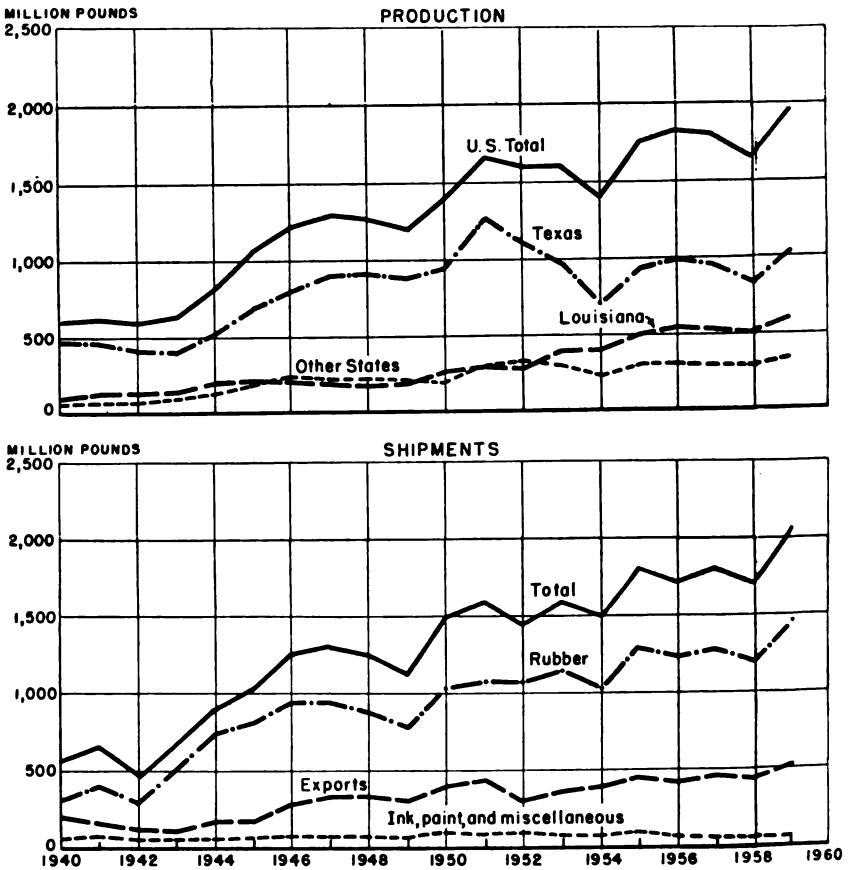

FIGURE 2.—Production and shipments of carbon black, 1940–59.

Digitized by Google

FOREIGN TRADE

Imports.—Imports of acetylene black in 1959 amounted to 7,247 thousand pounds, virtually no change from 1958. Canada, our major source of supply, accounted for 7,207 thousand pounds. The balance came from Germany. The average value increased from 18.0 cents per pound in 1958 to 18.4 cents in 1959. Imports of carbon black increased from 126 thousand pounds in 1958 to 347 thousand pounds in 1959, virtually all from Canada.

Exports.—Exports of carbon black increased 72,601 thousand pounds in 1959. About a third of this increase was shipped to countries in Asia. Shipments to other countries increased nominally.

TABLE 10.—Carbon black exported from the United States, in 1959, by months, in thousand pounds

[Bureau of the Census]

Month	Channel	Furnace	Total	Month	Channel	Furnace	Total
January	18,944	27,488	46,432	September	19,031	44,113	63,144
February	12,929	19,442	32,371	October	10,387	25,455	35,842
March	13,037	30,154	43,191	November	13,806	24,876	38,682
April	11,702	29,600	41,303	December	15,232	37,316	52,548
May	14,079	27,123	41,202				
June	10,501	24,404	34,905	Total:			
July	12,157	30,453	42,610	1959	164,518	348,625	513,143
August	12,713	28,201	40,913	1958	149,268	291,274	440,542

TABLE 11.—Carbon black exported from the United States, 1957–59, by countries of destination

[Bureau of the Census]

Country	1957		1958		1959	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
North America:						
Canada	37,706	2,952	31,266	2,603	38,936	3,231
Cuba	2,039	169	2,915	245	3,697	305
Mexico	15,779	1,289	19,041	1,605	19,420	1,583
Other North America	102	13	315	34	466	41
Total	55,626	4,423	53,537	4,487	62,519	5,160
South America:						
Argentina	19,128	1,816	16,828	1,505	20,295	1,780
Brazil	20,713	1,765	17,635	1,505	13,076	1,073
Chile	1,472	121	2,114	191	3,532	308
Colombia	7,203	625	5,663	499	5,855	532
Peru	3,305	282	2,135	187	3,041	278
Uruguay	1,321	111	2,355	191	1,422	122
Venezuela	6,906	599	8,557	758	9,571	859
Other South America	2	2	107	10	347	28
Total	60,050	5,321	55,394	4,846	57,139	4,980

Digitized by Google

TABLE 11.—Carbon black exported from the United States, 1957–59, by countries of destination—Continued

[Bureau of the Census]

Country	1957		1958		1959	
	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars	Thousand pounds	Thousand dollars
Europe:						
Austria	1,484	112	1,119	85	1,719	120
Belgium-Luxembourg	13,308	1,149	12,872	1,168	16,035	1,443
Denmark	1,036	111	1,321	149	1,446	178
Finland	872	87	774	77	1,273	104
France	81,162	7,082	77,117	6,925	70,969	6,379
Germany, West	18,095	1,575	21,127	1,840	29,743	2,549
Greece	503	45	675	56	410	36
Ireland	102	15	310	35	97	15
Italy	43,404	3,701	44,920	3,942	52,627	4,539
Netherlands	7,202	692	5,706	534	10,334	989
Norway	1,889	164	1,574	140	1,905	175
Poland					198	16
Portugal	1,978	159	1,417	121	2,630	216
Spain	11,066	948	8,700	838	10,248	935
Sweden	11,433	1,037	13,213	1,213	17,325	1,492
Switzerland	5,926	566	4,394	455	4,302	481
Trieste	121	8	233	16	45	3
U.S.S.R.					275	26
United Kingdom	27,333	3,033	23,846	2,750	27,187	3,170
Yugoslavia	1,523	138	2,323	221	2,633	248
Other Europe					72	8
Total	228,497	20,622	221,641	20,565	251,533	23,122
Asia:						
India	14,385	1,178	14,958	1,276	17,785	1,469
Indonesia	6,234	618	4,572	448	8,252	739
Israel	3,174	258	3,101	268	5,911	496
Japan	31,003	2,848	27,115	2,645	37,855	3,621
Korea, Republic of	1,041	99	1,784	168	4,252	439
Malaya, Federation of	634	58	300	27	631	56
Singapore			433	39	370	36
Pakistan	421	36	316	27	482	44
Philippines	6,016	535	6,844	611	6,192	550
Taiwan	258	25	343	35	1,349	130
Turkey	424	35	1,623	135	2,234	190
Other Asia	1,006	90	1,358	131	1,456	130
Total	64,596	5,780	62,747	5,810	86,769	7,900
Africa:						
Egypt	1,602	136	1,774	144	711	54
Union of South Africa	24,174	2,169	20,994	1,882	26,299	2,321
Other Africa	181	18	412	33	582	53
Total	25,957	2,323	23,180	2,059	27,592	2,428
Oceania:						
Australia	19,984	1,575	20,313	1,660	22,973	1,797
New Zealand	4,961	424	3,730	321	4,618	411
Total	24,945	1,999	24,043	1,981	27,591	2,208
Grand total	459,671	40,468	440,542	39,748	513,143	45,798

Digitized by Google

WORLD PRODUCTION

TABLE 12.—World production of carbon black, by countries,[1] 1955–59, in thousand pounds[2]

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country [1]	1955	1956	1957	1958	1959
Brazil	(3)	(3)	30,864	68,929	134,128
France	8,818	9,259	8,818	8,818	[4] 8,800
Germany, West	122,624	127,122	149,670	141,429	(3)
Japan	16,667	25,159	30,611	31,662	(3)
Taiwan	589	603	680	(3)	(3)
United Kingdom	170,016	182,784	234,035	243,936	269,069
United States	1,743,512	1,839,968	1,798,425	1,644,605	1,967,527
Yugoslavia	2,837	3,602	4,242	4,934	6,440

[1] Canada became a producer of carbon black in 1953, with completion in June of an oil-black furnace at Sernia, Ontario, having a capacity of 20 million pounds per year. The capacity was increased to 60 million pounds in 1956. The actual production is not published to avoid disclosing individual company confidential data.

[2] This table incorporates some revisions.

[3] Data not available.

[4] Estimate.

Digitized by Google

Digitized by Google

Natural Gas

By Ivan F. Avery [1] and Lulie V. Harvey [2]

Contents

	Page		Page
General summary	295	Interstate shipments, imports, and exports	302
Scope of report	296	Pipelines	307
Reserves	296	Consumption	307
Gross withdrawal	296	Value and prices	312
Underground storage of natural gas	296	World production	313

GENERAL SUMMARY

THE NATURAL-GAS industry again set new records in 1959, providing service to over 33 million customers who used a record 11,820 billion cubic feet of the fuel. Total value at point of consumption was 5,642 million dollars, 47.7 cents per thousand cubic feet compared with 46.2 cents in 1958.

Marketed production of natural gas in 1959 was 12,046 billion cubic feet, 9 percent higher than in 1958. The average value at the wellhead was 12.9 cents per thousand cubic feet in 1959, 1.0 cent higher than 1958.

TABLE 1.—Salient statistics of natural gas in the United States, 1955–59.

	1955	1956	1957	1958	1959
Supply:					
Marketed production [1] million cubic feet	9,405,351	10,081,923	10,680,258	[3] 11,030,298	12,046,115
Withdrawn from storage do	437,251	452,762	480,981	621,091	668,743
Imports do	10,888	10,380	37,941	135,797	133,990
Total do	9,853,490	10,545,065	11,199,180	11,787,186	12,848,848
Disposition:					
Consumption do	9,070,343	9,706,878	10,279,775	[3] 10,760,698	11,819,638
Exports do	31,029	35,963	41,655	38,719	18,413
Stored do	505,185	589,232	672,377	704,172	787,485
Lost in transmission, etc do	246,933	212,992	205,373	283,597	223,312
Total do	9,853,490	10,545,065	11,199,180	11,787,186	12,848,848
Value at wellhead:					
Total thousand dollars	978,357	1,083,812	1,201,759	[3] 1,317,521	1,556,800
Average cents per Mcf	10.4	10.8	11.3	11.9	12.9

[1] Comprises gas sold or consumed by products, including losses in transmission, amounts added to storage and increases in gas in pipelines.
[3] Includes 50 million cubic feet produced in Alaska with a value of $6,000.

[1] Commodity-industry analyst.
[2] Statistical assistant.

Digitized by Google

SCOPE OF REPORT

Data on natural-gas production, consumption, and value are collected by annual questionnaires sent to oil and gas producers, natural-gasoline-plant operators, gas-pipeline companies, and gas-utility companies. A separate report was filed by the respondent for each State in which he operated.

Volumes are reported at the pressure base selected by the reporting company; however, if the reported pressure base deviates more than 5 percent from 14.65 pounds per square inch absolute at 60° F., it is corrected to this base.

Reports are received covering approximately 75 percent of the gross natural-gas production. The large number of respondents and the difficulty of contacting each small producer make direct compilation of total production impractical. The bulk of the output of nonreporting producers is furnished in the purchases of reporting companies. Marketed production for each State equals consumption in the State, plus gas placed in storage, plus shipments to other States, less gas withdrawn from storage, less receipts from other States.

RESERVES

The American Gas Association Committee on Natural Gas Reserves reported that estimated proved recoverable reserves of natural gas in the United States totaled 262.6 trillion cubic feet at the end of 1959, increasing by 8.5 trillion cubic feet during the year. Of this increase, 6.3 trillion cubic feet was reported in nonassociated gas. The larger gains were reported in Texas and Louisiana, where increases of 4.3 and 3.8 trillion cubic feet, respectively, were shown.

GROSS WITHDRAWAL

Gross withdrawal equals marketed production, plus gas repressured, plus vent and waste gas. Gross withdrawal in 1959 was 14,229 billion cubic feet, 8 percent above the 13,146 billion cubic feet withdrawn in 1958. The quantity of gas vented and wasted is compiled from data given on the reporting forms, supplemented by estimated waste derived from figures published by the Natural Gas Reserves Committee of the American Gas Association and State conservation bodies.

UNDERGROUND STORAGE OF NATURAL GAS

The American Gas Association reported that the number of storage pools in operation reached a new peak of 209 in 1959 (205 in 1958). However, the ultimate capacity of these fields declined slightly to 2,521 billion cubic feet (2,718 billion cubic feet in 1958). Gross injections into underground storage in 1959 was 787 billion cubic feet; withdrawal was 669 billion cubic feet. Both gas injections and withdrawals were higher than in 1958. The net quantity stored in 1959 was 118 billion cubic feet.

Digitized by Google

TABLE 2.—Estimated proved recoverable reserves of natural gas in the United States, 1958–1959, in million cubic feet

[Committee on Natural Gas Reserves, American Gas Association]

State	Reserves as of Dec. 31, 1958 [1]	Changes in reserves during 1959			
		Extensions and revisions [1]	Discoveries of new fields and new pools in old fields [1]	Net change in underground storage [2]	Net production [3]
Arkansas	1,388,337	38,634	60,981	−41	65,094
California [4]	8,966,522	39,321	56,230	−2,787	465,839
Colorado	2,349,240	236,396	26,266	164	115,907
Illinois	170,528	11,655	279	11,112	18,464
Indiana	30,569	4,682	186	3,444	3,793
Kansas	20,233,847	279,359	97,365	9,895	639,063
Kentucky	1,215,329	−4,467	12,810	3,709	68,000
Louisiana [4]	55,111,862	6,100,270	1,509,830	0	2,868,042
Michigan	498,113	17,877	5,400	13,442	19,429
Mississippi	2,598,377	−16,750	68,031	1,571	164,705
Montana	682,013	−3,155	14,358	3,691	31,416
Nebraska	143,321	2,623	238	0	13,463
New Mexico	21,180,020	−2,758,846	196,341	−2,203	702,514
New York	96,439	8,925	1,575	3,717	4,137
North Dakota	1,124,470	97,481	0	0	15,409
Ohio	818,052	−60,859	11,170	16,714	36,311
Oklahoma	15,206,769	1,878,770	510,753	11,096	956,096
Pennsylvania	870,014	217,298	35,180	48,342	118,862
Texas [4]	115,045,743	8,228,792	2,887,699	5,004	5,691,455
Utah	1,058,051	176,088	74,372	0	44,261
Virginia	38,421	2,125	375	0	2,289
West Virginia	1,557,633	174,386	33,000	14,532	186,000
Wyoming	3,649,818	254,558	145,434	−102	202,644
Other States [5]	108,549	7,946	52,876	20,026	7,435
Total	254,142,037	14,933,109	5,800,749	161,326	12,440,628

State	Reserves as of December 31, 1959				
	Nonassociated [6]	Associated [7]	Dissolved [8]	Underground storage [9]	Total
Arkansas	929,225	288,939	199,822	4,831	1,422,817
California [4]	2,155,750	2,011,601	4,335,078	91,018	8,593,447
Colorado	1,839,459	96,175	560,361	164	2,496,159
Illinois	11,089	0	118,881	45,140	175,110
Indiana	1,300	1,350	22,185	10,253	35,088
Kansas	19,155,537	407,100	356,064	62,702	19,981,403
Kentucky	1,059,322	0	75,866	24,193	1,159,381
Louisiana [4]	48,135,211	8,248,993	3,469,716	0	59,853,920
Michigan	116,255	55,159	58,730	285,259	515,403
Mississippi	1,805,406	372,200	303,380	5,538	2,486,524
Montana	494,850	38,863	90,721	41,057	665,491
Nebraska	99,249	12,609	20,861	0	132,719
New Mexico	12,722,502	3,524,188	1,618,367	47,741	17,912,798
New York	48,801	0	158	57,560	106,519
North Dakota	9,997	340,498	856,047	0	1,206,542
Ohio	325,000	0	87,000	336,766	748,766
Oklahoma	11,097,644	1,991,355	3,456,676	105,617	16,651,292
Pennsylvania	622,676	0	25,040	404,256	1,051,972
Texas [4]	78,166,487	26,932,160	15,332,872	44,264	120,475,783
Utah	799,877	25,640	438,733	0	1,264,250
Virginia	38,632	0	0	0	38,632
West Virginia	1,270,624	0	64,633	258,294	1,593,551
Wyoming	3,156,424	155,890	514,326	20,424	3,847,064
Other States [5]	109,170	0	16,673	56,119	181,962
Total	184,170,487	44,502,720	32,022,190	1,901,196	262,596,593

[1] Excludes gas loss due to natural-gas liquids recovery.

[2] The net difference between gas stored in and gas withdrawn from underground storage reservoirs, including adjustments and native gas transferred from other reserve categories.

[3] Net production equals gross withdrawals less gas injected into producing reservoirs. Changes in underground storage and gas loss due to natural-gas liquids recovery are excluded. Fourth-quarter production estimated in some instances.

[4] Includes offshore reserves.

[5] Includes Alabama, Florida, Iowa, Maryland, and Missouri.

[6] Nonassociated gas is free gas not in contact with crude oil in the reservoir; and free gas in contact with oil where the production of such gas is not significantly affected by the production of crude oil.

[7] Associated gas is free gas in contact with crude oil in the reservoir where the production of such gas is significantly affected by the production of crude oil.

[8] Dissolved gas is gas in solution with crude oil in the reservoirs.

[9] Gas held in underground reservoirs (including native and net injected gas) for storage purposes.

Digitized by Google

TABLE 3.—Gross withdrawals and disposition of natural gas in the United States, 1958–59, by States, in million cubic feet

State	Gross withdrawals [1]			Disposition		
	From gas wells	From oil wells	Total	Marketed production [2]	Repressuring	Vented and wasted [3]
1958						
Arkansas	23,000	45,000	68,000	32,890	28,180	6,930
California	133,000	575,000	708,000	465,582	241,141	1,277
Colorado	44,000	124,000	168,000	82,464	45,145	40,391
Illinois	3,000	18,000	21,000	12,983	47	7,970
Indiana	300	3,600	3,900	378		3,522
Kansas	529,000	61,000	590,000	561,816	421	27,763
Kentucky	70,000	3,000	73,000	72,248		752
Louisiana	2,223,000	505,000	2,728,000	2,451,587	220,616	55,797
Maryland	4,266		4,266	4,266		
Michigan	12,000	5,000	17,000	14,243	1,893	864
Mississippi	179,000	79,000	258,000	160,143	73,204	24,653
Montana	23,000	8,000	31,000	27,989	942	2,069
Nebraska	7,000	10,000	17,000	11,405	394	5,201
New Mexico	513,000	268,000	781,000	761,446	10,686	8,868
New York	2,900	200	3,100	2,808		292
North Dakota	2,000	18,000	20,000	17,325		2,675
Ohio	28,900	5,000	33,900	31,786	50	2,064
Oklahoma	530,000	510,000	1,040,000	696,504	99,546	243,950
Pennsylvania	101,000	3,000	104,000	95,869	162	7,969
Texas	4,417,000	1,666,000	6,083,000	5,178,073	743,409	161,518
Utah	17,000	11,400	28,400	19,247	1,036	8,117
Virginia	2,600		2,600	2,521		79
West Virginia	201,000	4,000	205,000	204,581	111	308
Wyoming	88,000	70,000	158,000	121,682	15,992	20,326
Other States [4]	85	384	469	412		57
Total	9,154,051	3,992,584	13,146,635	11,030,248	1,482,975	633,412
1959						
Arkansas	32,000	40,800	72,800	40,674	27,488	4,638
California	150,000	607,000	757,000	485,655	267,062	4,283
Colorado	50,000	114,000	164,000	99,899	43,125	20,976
Illinois	2,600	17,000	19,600	13,739	3	5,858
Indiana	300	3,500	3,800	484		3,316
Kansas	585,000	62,000	647,000	604,410	457	42,133
Kentucky	70,000	4,000	74,000	73,504		496
Louisiana	2,442,000	514,000	2,956,000	2,670,271	186,599	99,130
Maryland	4,373		4,373	4,373		
Michigan	16,000	5,500	21,500	18,916	2,022	562
Mississippi	143,000	90,000	233,000	162,095	67,044	3,861
Montana	24,500	8,500	33,000	30,743	1,154	1,103
Nebraska	7,000	8,500	15,500	13,128	619	1,753
New Mexico	472,000	286,000	758,000	739,660	7,086	11,254
New York	2,900	200	3,100	2,915		185
North Dakota	1,500	18,000	19,500	17,915		1,585
Ohio	32,000	4,500	36,500	34,664	92	1,744
Oklahoma	601,000	495,000	1,096,000	811,508	102,022	182,470
Pennsylvania	107,000	3,000	110,000	99,366	1,487	9,147
Texas	5,037,000	1,714,000	6,751,000	5,718,993	877,487	154,520
Utah	17,000	34,800	51,800	38,921	5,937	6,942
Virginia	2,300		2,300	2,280		20
West Virginia	202,000	3,000	205,000	204,633	26	341
Wyoming	100,000	94,000	194,000	156,978	22,399	14,623
Other States [4]	281	218	499	391		108
Total	10,101,754	4,127,518	14,229,272	12,046,115	1,612,109	571,048

[1] Marketed production plus quantities used in repressuring, vented, and wasted.
[2] Comprises gas sold or consumed by producers, including losses in transmission, quantities added to storage, and increases in gas in pipelines.
[3] Partly estimated: Includes direct waste on producing properties and residue blown to the air.
[4] Alabama, Alaska, Arizona, Florida, South Dakota, and Tennessee.

Digitized by Google

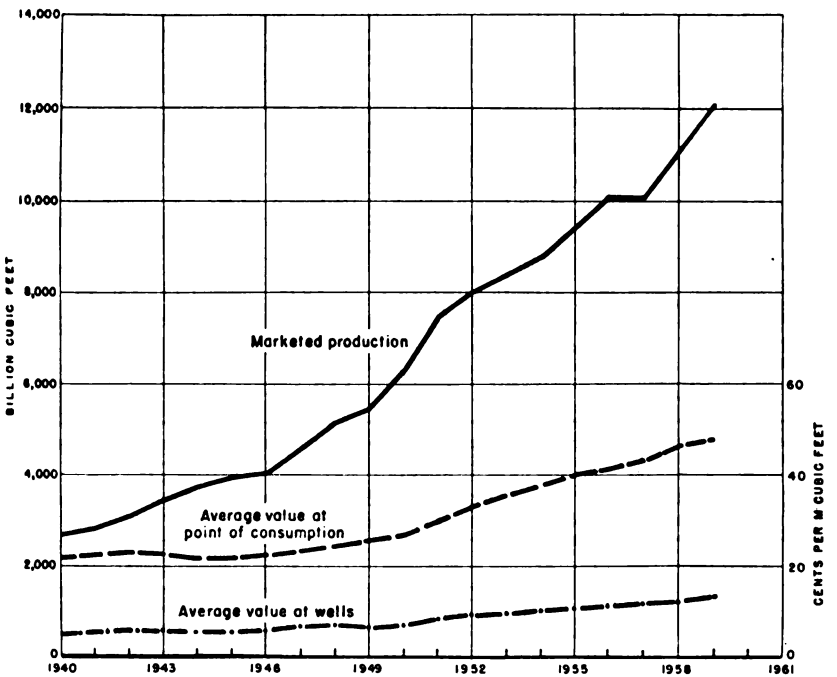

FIGURE 1.—Production and average value of natural gas in the United States, 1940–59.

Digitized by Google

TABLE 4.—Marketed production of natural gas in the United States, 1955–59, by States[1]

State	Quantity (million cubic feet)					Change from 1958 (percent)	Estimated value at wells (thousand dollars)	
	1955	1956	1957	1958	1959		1958	1959
Alabama	282	42	190	323	172	−46.7	30	17
Alaska				50	133	166.0	6	16
Arizona	15	21						
Arkansas	32,123	30,162	31,327	32,890	40,674	23.7	2,664	3,539
California	538,178	504,458	492,338	465,582	485,655	4.3	108,481	119,471
Colorado	49,152	54,205	95,259	82,464	99,899	21.1	8,659	10,989
Florida	36	35	34	35	34	−2.9	5	5
Illinois	8,033	6,177	9,647	12,983	13,739	5.8	1,921	1,910
Indiana	1,226	791	671	378	484	28.0	59	92
Kansas	471,041	526,091	586,690	561,816	604,410	7.6	64,047	72,529
Kentucky	73,214	73,687	70,024	72,248	73,504	1.7	17,412	17,420
Louisiana	1,680,032	1,886,302	2,078,901	2,451,587	2,670,271	8.9	316,255	411,222
Maryland	3,116	4,619	4,649	4,266	4,373	2.5	1,148	1,181
Michigan	8,300	10,911	9,122	14,243	18,916	32.8	2,649	4,350
Mississippi	163,167	185,137	169,967	160,143	162,095	1.2	22,260	25,125
Missouri	15	12	12					
Montana	28,255	25,847	28,638	27,989	30,743	9.8	1,903	2,306
Nebraska	12,515	13,541	14,249	11,405	13,128	15.3	1,711	2,087
New Mexico	540,664	626,340	723,004	761,446	739,660	−2.9	79,190	73,966
New York	3,637	4,098	2,869	2,808	2,915	3.8	859	899
North Dakota	5,256	11,725	15,450	17,325	17,915	3.4	1,672	1,774
Ohio	33,756	25,368	30,384	31,786	34,664	9.1	6,802	8,042
Oklahoma	614,976	678,603	719,794	696,504	811,508	16.5	70,347	81,151
Pennsylvania	99,172	104,508	101,801	95,869	99,366	3.6	27,131	29,015
Tennessee	39	45	38	54	52	−3.7	9	9
Texas	4,730,798	4,999,889	5,156,215	5,178,073	5,718,993	10.4	517,807	617,651
Utah	17,163	17,268	16,824	19,247	38,921	102.2	2,829	5,527
Virginia	968	2,926	2,465	2,521	2,280	−9.6	681	597
West Virginia	212,403	204,717	202,440	204,581	204,633		50,734	53,205
Wyoming	77,819	84,398	117,256	121,682	156,978	29.0	10,221	12,715
Total	9,405,351	10,081,923	10,680,258	11,030,298	12,046,115	9.2	1,317,492	1,556,800

[1] Comprises gas either sold or consumed by producers, including losses in transmission, quantities added to storage, and increases of gas in pipelines.

TABLE 5.—Natural gas stored underground in and withdrawn from storage fields, 1958–59, by State of location, in million cubic feet

State	1958			1959		
	Total stored	Total withdrawn	Net stored	Total stored	Total withdrawn	Net stored
Arkansas	1,139	73	1,066	213	388	−175
California	47,108	30,138	16,970	46,756	39,045	7,711
Delaware				159	29	130
Illinois	12,591	18,740	−6,149	15,532	14,236	1,296
Indiana	5,593	4,963	630	9,656	5,882	3,774
Iowa	19,602	2,925	16,677	26,096	9,185	16,911
Kansas	31,530	26,973	4,557	33,193	31,125	2,068
Kentucky	9,758	10,574	−816	12,667	10,846	1,821
Michigan	96,798	108,512	−11,714	120,664	112,556	8,108
Mississippi	4,509	3,266	1,243	3,712	2,679	1,033
Missouri	3,363	1,199	2,164	4,245	1,727	2,518
Montana	5,666	3,426	2,240	6,859	3,206	3,653
Nebraska		200	−200		86	−86
New Mexico	7,271	6,658	613	5,141	6,880	−1,739
New York	32,097	22,424	9,673	43,414	26,853	16,561
Ohio	99,218	84,088	15,130	112,832	87,511	25,321
Oklahoma	24,941	19,818	5,123	20,102	22,092	−1,990
Pennsylvania	150,062	150,475	−413	168,111	159,220	8,891
Texas	24,787	11,850	12,937	26,172	18,098	8,074
West Virginia	123,324	111,526	11,798	128,536	113,276	15,260
Wisconsin	70		70			
Wyoming	4,745	3,263	1,482	3,425	3,823	−398
Total	704,172	621,091	83,081	787,485	668,743	118,742

Digitized by Google

TABLE 6.—Underground storage statistics, by States, December 31, 1959

[American Gas Association]

State	Number of pools	Number of active wells	Total gas in storage reservoirs (million cubic feet)	Total reservoir capacity (million cubic feet)
Arkansas	2	17	4,831	5,204
California	4	111	91,019	99,038
Colorado	2	4	164	187
Illinois	4	76	45,140	45,915
Indiana	7	134	10,253	12,454
Iowa	2	100	46,401	49,894
Kansas	14	717	62,702	83,623
Kentucky	7	361	24,193	27,265
Michigan	19	1,124	285,259	397,498
Mississippi	2	22	5,538	7,057
Missouri	1	31	9,718	9,717
Montana	4	109	41,057	87,075
New Mexico	4	68	47,741	77,871
New York	13	596	57,560	65,232
Ohio	17	2,080	336,766	433,516
Oklahoma	7	72	105,617	179,977
Pennsylvania	54	1,907	404,256	496,848
Texas	6	71	44,264	50,687
West Virginia	38	904	258,295	328,524
Wyoming	2	8	20,424	62,972
Total	209	8,512	1,901,198	2,520,554

TABLE 7.—Gas wells in the United States, 1958–59, by States

State	Drilled during 1958 [1]	Producing Dec. 31, 1958	Drilled during 1959 [1]	Producing Dec. 31, 1959
Arkansas	37	300	41	320
Alaska			3	2
California	39	535	73	569
Colorado	80	250	83	318
Illinois	49	35	9	35
Indiana	16	380	11	350
Kansas	228	6,000	174	5,700
Kentucky	139	4,330	289	4,690
Louisiana	214	4,500	196	5,000
Michigan	27	270	54	230
Mississippi	2	250	2	300
Missouri [2]	2	40	1	50
Nebraska [2]				
Montana	6	1,090	11	1,176
New Mexico	491	4,000	359	5,000
New York	15	980	8	920
Ohio	249	6,300	297	6,700
Oklahoma	340	5,000	392	5,300
Pennsylvania	281	16,300	327	16,500
Tennessee	4	30	5	25
Texas	855	15,340	779	16,750
West Virginia	512	14,000	550	12,740
Wyoming	66	300	74	390
Other States [3]	22	170	23	160
Total	3,674	80,400	3,761	83,225

[1] From Oil and Gas Journal.
[2] Missouri and Nebraska combined to avoid disclosing individual company operations.
[3] Alabama, Maryland, North Dakota, Utah, and Virginia.

Digitized by Google

INTERSTATE SHIPMENTS, IMPORTS, AND EXPORTS

Interstate shipments, including exports, increased from 6,478,289 million cubic feet in 1958 to 7,176,157 million cubic feet in 1959, an 11-percent increase. Interstate shipments in 1959 comprised 60 percent of marketed production, compared with 59 percent in 1958.

Exports to Canada were 11,739 million cubic feet in 1959, compared with 32,129 million cubic feet in 1958, a decrease of 63 percent. Exports to Mexico—6,674 million cubic feet—remained at substantially the 1958 level. These export statistics do not include liquefied methane shipped by tanker.

Imports of 134 billion cubic feet of natural gas in 1959 were substantially at the 1958 level. Canadian natural gas received in Washington and Montana totaled 83 billion cubic feet. The balance was received in Texas from Mexico.

TABLE 8.—Marketed production, interstate shipments, and total consumption of natural gas in the United States, in 1959, in million cubic feet

Census regions and States	Marketed production		Interstate movements		Transmission loss and unaccounted for	Change in underground storage	Consumption
	Quantity	Average value at wellhead (cents per M c.f.)	Quantity shipped	Quantity received			
New England:							
Connecticut				27,143	1,268		25,875
Maine							
Massachusetts				73,972	978		72,994
New Hampshire				2,594	114		2,480
Rhode Island				11,195	184		11,011
Vermont							
Total: 1959				114,904	2,544		112,360
1958				112,344	4,497		107,847
Middle Atlantic:							
New Jersey				146,575	13,591		132,984
New York	2,915	30.5	2,780	402,624	6,270	16,561	379,928
Pennsylvania	99,366	29.2	96,272	523,942	16,079	8,891	502,066
Total: 1959	102,281	29.2	99,052	1,073,141	35,940	25,452	1,014,978
1958	98,677	28.4	86,186	973,492	47,719	9,260	929,004
East North Central:							
Illinois	13,739	13.9	725	517,968	11,575	1,296	518,111
Indiana	484	19.0	195	178,668	4,025	3,774	171,158
Michigan	18,916	23.0		325,897	3,949	8,108	332,756
Ohio	34,604	23.2	1,314	659,789	−2,800	25,321	670,618
Wisconsin				85,511	3,134		82,377
Total: 1959	67,803	21.2	2,234	1,767,833	19,883	38,499	1,775,020
1958	59,390	19.2	4,227	1,580,765	47,650	−2,033	1,590,311
West North Central:							
Iowa				202,122	2,384	16,911	182,827
Kansas	604,410	12.0	462,438	252,332	11,995	2,068	380,241
Minnesota				160,701	−689		161,390
Missouri				261,552	3,939	2,518	255,095
Nebraska	13,128	15.9	408	119,670	−175	−86	132,651
North Dakota	17,915	9.9	3,516	2,985	403		16,981
South Dakota				23,567	−17		23,584
Total: 1959	635,453	12.0	466,362	1,022,929	17,840	21,411	1,152,769
1958	590,546	11.4	428,791	945,393	21,572	23,198	1,062,378

Digitized by Google

TABLE 8.—Marketed production, interstate shipments, and total consumption of natural gas in the United States, in 1959, in million cubic feet—Continued

Census regions and States	Marketed production		Interstate movements		Transmission loss and unaccounted for	Change in underground storage	Consumption
	Quantity	Average value at wellhead (cents per M c.f.)	Quantity shipped	Quantity received			
South Atlantic:							
Delaware				9,747	158	130	9,459
District of Columbia				17,465	342		17,123
Florida	34	14.3		91,527	71		91,490
Georgia				181,817	1,475		180,342
Maryland	4,373	27.0	1,748	57,959	−90		60,674
North Carolina				34,219	1,534		32,685
South Carolina				55,742	1,379		54,363
Virginia	2,280	26.2	2,274	62,807	2,971		59,842
West Virginia	204,633	26.0	239,262	240,122	−1,315	15,260	191,548
Total: 1959	211,320	26.0	243,284	751,405	6,525	15,390	697,526
1958	211,403	24.9	182,936	571,806	13,368	11,798	575,107
East South Central:							
Alabama	172	9.7	29	179,357	905		178,595
Kentucky	73,504	23.7	51,947	128,085	−172	1,821	147,993
Mississippi	162,095	15.5	90,102	114,009	1,811	1,033	183,158
Tennessee	52	16.7		150,714	1,304		149,462
Total: 1959	235,823	18.0	142,078	572,165	3,848	2,854	659,208
1958	232,768	17.1	241,105	633,482	15,293	427	609,425
West South Central:							
Arkansas	40,674	8.7	2,219	192,085	12,187	−175	218,528
Louisiana	2,670,271	15.4	1,910,683	140,884	7,103		893,369
Oklahoma	811,508	10.0	434,345	22,014	21,989	−1,990	379,178
Texas	5,718,993	10.8	2,964,864	161,239	41,699	8,074	2,865,595
Total: 1959	9,241,446	12.0	5,312,111	516,222	82,978	5,909	4,356,670
1958	8,359,054	10.9	4,681,860	472,577	99,460	19,126	4,031,185
Mountain:							
Arizona				123,860	11,138		112,722
Colorado	99,899	11.0	65,764	165,439	3,517		196,057
Idaho				19,227	−414		19,641
Montana	30,743	7.5	4,720	31,391	1,578	3,653	52,183
Nevada				10,436	−14		10,450
New Mexico	739,660	10.0	555,062	92,327	5,742	−1,739	272,922
Utah	38,921	14.2	37,126	60,207	601		61,401
Wyoming	156,978	8.1	114,374	16,951	834	−398	59,119
Total: 1959	1,066,201	9.9	777,046	519,838	22,982	1,516	784,495
1958	1,012,828	10.1	717,387	428,466	18,851	4,335	700,721
Pacific:							
Alaska	133	12.0					133
California	485,655	24.6		729,927	27,540	7,711	1,180,331
Oregon				29,597	2,099		27,498
Washington				59,783	1,133		58,650
Total: 1959	485,788	24.6		819,307	30,772	7,711	1,266,612
1958	465,582	23.3		721,245	15,187	16,970	1,154,670
Total United States:							
1959	12,046,115	12.9	7,042,167	7,157,744	223,312	118,742	11,819,638
1958	11,030,248	11.9	6,342,492	6,439,570	283,547	83,081	10,760,648

Digitized by Google

TABLE 9.—Natural gas moving interstate, imports and exports, 1959, in million cubic feet

Consuming regions and countries or States	Quantity received	Producing region							
		Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Foreign
New England:									
Connecticut	27,143	923	51		5	937	24,466		761
Massachusetts	73,972	2,604	146		8	2,642	66,425		2,147
New Hampshire	2,594						2,594		
Rhode Island	11,195	526	29		9	534	9,663		434
Total	114,904	4,053	226		22	4,113	103,148		3,342
Middle Atlantic:									
New Jersey	146,575	5,685	191		425	3,691	133,753		2,830
New York	402,624	70,747	92		9,734	6,551	310,692		4,808
Pennsylvania	523,942	2,888	1,180		55,664	18,682	432,564		12,964
Total	1,073,141	79,320	1,463		65,823	28,924	877,009		20,602
East North Central:									
Illinois	517,968		195	33,304		94	483,391	524	460
Indiana	178,668		131	28,839		717	147,796	160	1,025
Michigan	325,897			54,813		355	270,162	181	386
Ohio	659,789	14,980	195	28,494	129,647	32,006	442,280	238	11,949
Wisconsin	85,511		4	1,899			83,602	6	
Total	1,767,833	14,980	525	147,349	129,647	33,172	1,427,231	1,109	13,820
West North Central:									
Iowa	202,122		13	53,579			144,465	4,065	
Kansas	252,332			514			216,569	35,249	
Minnesota	160,701			53,026			102,752	4,923	
Missouri	261,552			82,652		99	177,752	413	636
Nebraska	119,670			48,892			57,258	13,520	
North Dakota	2,985			309				2,676	
South Dakota	23,567			5,924			9,933	7,710	
Total	1,022,929		13	244,896		99	708,729	68,556	636
South Atlantic:									
Delaware	9,747	229			44	47	9,410		17
District of Columbia	17,465	149			6,631	919	9,766		
Florida	91,527					12,050	79,477		
Georgia	181,817					11,572	170,157		88
Maryland	57,959	311	3		17,681	5,198	34,724		42
North Carolina	34,219					63	34,151		5

Digitized by Google

South Carolina	55,742					1,865	53,858		19
Virginia	62,807				20,432	3,978	38,396		1
West Virginia	240,122	10	4		1,538	17,995	220,501		74
Total	751,405	699	7		46,326	53,687	650,440		246
East South Central:									
Alabama	179,357					20,427	158,800		130
Kentucky	128,085				1,466	513	124,938		1,168
Mississippi	114,009					183	112,974		852
Tennessee	150,714					267	149,267		1,180
Total	572,165				1,466	21,390	545,979		3,330
West South Central:									
Arkansas	192,085					23	191,327		735
Louisiana	140,884					635	136,817		3,432
Oklahoma	22,014			1,841			20,028	144	
Texas	161,239			154		35	124,351	31,913	4,786
Total	516,222			1,996		693	472,523	32,057	8,953
Mountain:									
Arizona	123,860						57,144	66,716	
Colorado	165,439			64,121			43,090	58,228	
Idaho	19,227						108	19,119	
Montana	31,391			2,313				14,757	14,321
Nevada	10,436						4,821	5,615	
New Mexico	92,327			5			69,637	22,685	
Utah	60,207						1,321	58,886	
Wyoming	16,951			1,662			1,295	13,994	
Total	519,838			68,101			177,416	260,000	14,321
Pacific:									
California	729,927						337,226	392,701	
Oregon	29,597						116	20,524	8,957
Washington	59,783								59,783
Total	819,307						337,342	413,225	68,740
Total United States	7,157,744	99,052	2,234	462,342	243,284	142,078	5,299,817	774,947	133,990
Canada	11,739			4,020			7,561	158	
Mexico	6,674						4,733	1,941	
Total exports	18,413			4,020			12,294	2,099	
Total	7,176,157	99,052	2,234	466,362	243,284	142,078	5,312,111	777,046	133,990

Digitized by Google

TABLE 10.—Consumption of natural gas in the United States, 1955–59, by States[1]

State	Quantity (million cubic feet)					Change from 1958 (percent)	Estimated value at points of consumption (thousand dollars)	
	1955	1956	1957	1958	1959		1958	1959
Alabama	151,325	160,261	165,772	172,406	178,595	3.6	77,270	85,939
Alaska					133			21
Arizona	88,983	105,860	105,536	105,034	112,722	7.3	42,192	46,487
Arkansas	197,374	196,297	201,306	202,361	218,528	8.0	54,427	59,686
California	1,020,395	1,021,002	1,091,236	1,078,855	1,180,331	9.4	561,741	618,513
Colorado	143,018	145,640	176,936	165,099	196,057	18.8	53,468	78,750
Connecticut	14,187	18,109	20,328	27,884	25,875	−7.2	47,978	43,051
Delaware	4,280	5,824	6,014	8,301	9,459	14.0	7,865	8,952
District of Columbia	15,042	15,833	15,701	17,594	17,128	−2.7	24,561	25,164
Florida	26,402	35,322	38,871	44,174	91,490	107.1	13,999	52,049
Georgia	133,044	148,567	154,778	164,114	180,342	9.9	81,656	92,575
Idaho		765	10,733	15,903	19,641	23.5	7,061	9,491
Illinois	398,718	417,443	422,840	452,006	518,111	14.6	312,383	367,741
Indiana	126,897	140,135	145,179	154,583	171,158	10.7	105,052	116,636
Iowa	138,661	147,892	154,964	159,982	182,827	14.3	81,943	96,020
Kansas	309,028	324,335	343,833	362,280	380,241	5.0	106,688	110,841
Kentucky	117,496	126,580	132,436	136,990	147,993	8.0	73,080	76,919
Louisiana	774,320	839,393	840,331	931,203	893,369	−4.1	176,716	190,598
Maryland	39,889	47,553	51,177	57,328	60,674	5.8	73,007	79,254
Massachusetts	43,932	50,691	56,626	67,602	72,994	8.0	110,402	117,165
Michigan	207,005	243,465	272,353	298,104	332,756	11.6	239,350	276,011
Minnesota	123,734	136,831	147,732	149,042	161,390	8.3	88,399	95,690
Mississippi	138,186	145,353	148,279	157,169	183,158	16.5	51,263	60,904
Missouri	199,272	219,424	223,528	241,239	255,095	5.7	127,674	134,337
Montana	47,491	47,690	52,200	51,825	52,183	0.7	19,922	21,711
Nebraska	102,177	109,265	116,326	114,661	132,651	15.7	52,803	61,318
Nevada	2,484	6,676	8,666	8,826	10,450	18.4	6,468	7,515
New Hampshire	1,206	1,445	1,787	2,421	2,480	2.4	3,825	3,904
New Jersey	74,601	90,092	100,483	119,946	132,984	10.9	180,535	186,658
New Mexico	215,281	229,821	243,800	251,518	272,922	8.5	40,607	46,714
New York	243,513	268,408	299,153	343,326	379,928	10.7	428,696	503,262
North Carolina	12,644	16,579	19,533	23,519	32,685	39.0	17,612	26,822
North Dakota	9,320	10,428	13,753	15,639	16,981	8.6	4,945	5,698
Ohio	500,865	561,557	583,753	618,022	670,618	8.5	404,664	444,549
Oklahoma	334,057	358,930	387,277	342,080	379,178	10.8	83,768	96,413
Oregon		4,473	18,227	22,752	27,498	20.9	18,389	21,888
Pennsylvania	390,280	431,325	445,813	465,732	502,066	7.8	343,055	392,276
Rhode Island	5,375	6,242	8,139	9,940	11,011	10.8	16,499	18,057
South Carolina	23,043	44,467	39,741	39,678	54,363	37.0	26,244	36,115
South Dakota	16,107	18,002	18,251	19,535	23,584	20.7	10,704	13,111
Tennessee	118,052	126,815	130,601	142,860	149,462	4.6	71,423	72,856
Texas	2,236,540	2,323,847	2,455,528	2,555,541	2,865,595	12.1	448,143	531,885
Utah	48,903	54,669	57,004	55,706	61,401	10.2	25,235	27,927
Virginia	38,884	43,362	48,527	56,052	59,842	6.8	56,304	60,552
Washington		5,224	40,108	53,063	58,650	10.5	29,207	33,394
West Virginia	158,006	161,246	159,520	164,347	191,548	16.6	79,962	91,382
Wisconsin	40,621	48,188	59,592	67,596	82,377	21.9	69,560	81,158
Wyoming	39,705	45,552	45,504	46,810	59,119	26.3	11,153	13,733
Total	9,070,343	9,706,878	10,279,775	10,760,648	11,819,638	9.8	4,967,898	5,641,692

[1] Includes natural gas mixed with manufactured gas.

Digitized by Google

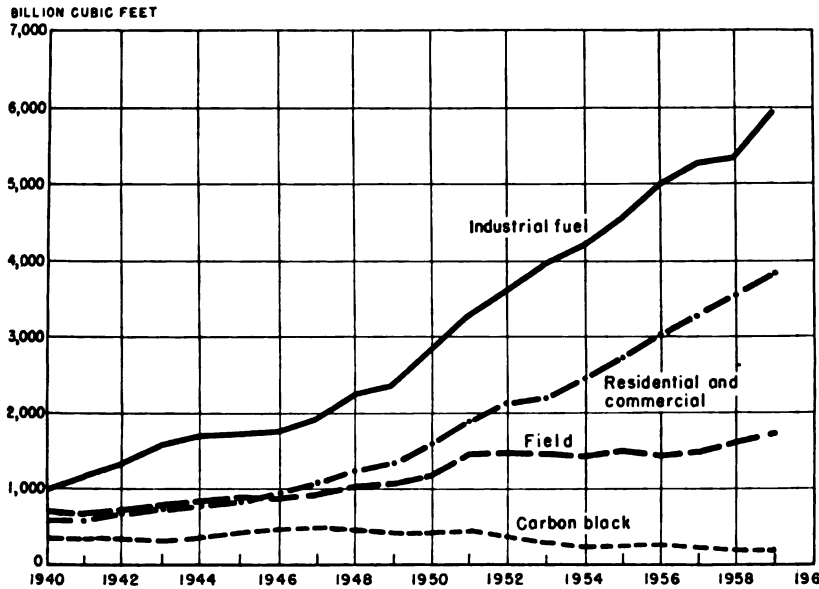

FIGURE 2.—Consumption of natural gas, by uses, in the United States, 1940–59.

PIPELINES

The American Gas Association reports the gas-utility industry had a total of 574,030 miles of natural-gas mains in use at the end of 1959, an increase of 6 percent over the previous year's total. This increment of 33,240 miles is second only to the record level added to the Nation's network of natural-gas mains in 1956.

Total miles of natural-gas transmission mains at the end of 1959 aggregated 172,240, an increase of 6 percent over the preceding year; distribution facilities increased 7 percent to 347,660 miles; field and gathering lines totaled 54,130 miles.

The total cost of the construction authorized by the Federal Power Commission in 1959 was $1,202,098,700. In addition to the 11,547 miles of line requiring an estimated 2,201,756 net tons of steel line pipe, authorized construction included the installation of compressors aggregating 798,219 horsepower. These projects, when completed, will add approximately 4.6 billion cubic feet daily of capacity to existing facilities.

CONSUMPTION

Maine and Vermont again were the only States not supplied with natural gas. Alaska, as a State, is included in these statistics for the first time. Total consumption in 1959 totaled 11,820 billion cubic feet, an increase of 10 percent over 1958.

Consumption by class of consumer and the percent change from 1958 were as follows: Residential, 2,913 billion cubic feet (+7 percent); commercial, 975 billion cubic feet (+12 percent); industrial fuel, 5,980 billion cubic feet (+8 percent); and carbon black, 215 billion cubic feet (+2 percent). The portland cement industry consumed 188 billion cubic feet in 1959 or 15 percent more than 1958.

Digitized by Google

TABLE 11.—Residential and commercial consumption of natural gas in the United States in 1959, by States [1]

State	Residential				Commercial				Total			
	Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption		Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption		Number of consumers (thousand)	Quantity (million cubic feet)	Value at point of consumption	
			Total (thousand dollars)	Average (cents per M c.f.)			Total (thousand dollars)	Average (cents per M c.f.)			Total (thousand dollars)	Average (cents per M c.f.)
Alabama	457	40,255	40,926	101.7	37	15,837	9,359	59.1	494	56,092	50,285	89.6
Alaska	[2]	132	21	15.9					[2]	132	21	15.9
Arizona	263	23,820	18,164	76.3	28	21,878	9,264	42.3	291	45,698	27,428	60.0
Arkansas	256	30,044	19,421	64.6	39	16,051	7,854	48.9	295	46,095	27,275	59.2
California	4,012	300,096	284,760	94.9	322	99,055	61,489	62.1	4,334	399,151	346,249	86.7
Colorado	339	50,771	36,070	71.0	44	27,799	16,449	59.2	383	78,570	52,519	66.8
Connecticut	351	14,196	29,811	210.0	23	2,712	5,117	188.7	374	16,908	34.928	206.6
Delaware, District of Columbia, and Maryland	[3] 713	54,443	83,293	153.0	58	10,885	15,053	138.3	771	65,328	98,346	150.5
Florida	523	19,216	26,656	138.7	21	6,980	6,163	88.3	544	26,196	32,819	125.3
Georgia	507	51,874	47,695	91.9	45	18,894	11,417	60.4	552	70,768	59,112	83.5
Idaho	17	1,466	1,762	120.2	4	2,696	2,065	76.6	21	4,162	3,827	92.0
Illinois	2,089	206,541	235,846	114.2	114	39,488	32,726	82.9	2,203	246,029	268,572	109.2
Indiana	687	67,817	67,075	98.9	64	17,938	15,702	87.5	751	85,755	82,777	96.5
Iowa	458	57,004	49,126	86.2	50	26,051	16,149	62.0	508	83,055	65,275	78.6
Kansas	526	71,177	39,945	56.1	70	45,092	18,065	40.1	596	116,269	58,010	49.9
Kentucky	387	58,002	43,357	74.8	39	16,640	10,820	65.0	426	74,642	54,177	72.6
Louisiana	799	68,727	41,935	61.0	63	35,674	13,542	38.0	862	104,401	55,477	53.1
Massachusetts	942	41,401	86,381	208.6	56	9,420	16,464	174.8	998	50,821	102,845	202.4
Michigan	1,381	192,963	183,451	95.1	115	38,456	30,901	80.4	1,496	231,419	214,352	92.6
Minnesota	424	61,357	59,571	97.1	31	19,698	13,120	66.6	455	81,055	72,691	89.7
Mississippi	242	21,751	18,940	87.1	33	12,711	6,583	51.8	275	34,462	25,523	74.1
Missouri	750	97,824	78,433	80.2	59	36,459	21,933	60.2	809	134,283	100,366	74.7
Montana	108	17,405	11,262	64.7	13	11,185	5,113	45.7	121	28,590	16,375	57.3
Nebraska	279	38,006	30,340	79.8	37	19,656	10,991	55.9	316	57,662	41,331	71.7
Nevada	14	1,733	2,200	126.9	2	654	477	72.9	16	2,387	2,677	112.1
New Hampshire	30	1,566	2,648	169.1	2	471	715	151.8	32	2,037	3,363	165.1
New Jersey	1,376	66,581	141,167	212.0	141	9,853	17,936	182.0	1,517	76,434	159,103	208.2
New Mexico	150	18,456	14,581	79.0	19	8,531	4,031	47.3	169	26,987	18,612	69.0
New York	3,786	208,911	345,394	165.3	290	57,585	88,249	153.2	4,076	266,496	433,643	162.7
North Carolina	128	8,845	12,744	144.1	15	3,553	4,879	137.3	143	12,398	17,623	142.1
North Dakota	22	3,799	2,889	76.0	4	2,623	1,432	54.6	26	6,422	4,321	67.3
Ohio	2,022	352,417	262,636	74.5	164	100,754	70,136	69.6	2,186	453,171	332,772	73.4
Oklahoma	540	59,763	39,916	66.8	58	27,602	11,952	43.3	598	87,365	51,868	59.4
Oregon	84	7,056	10,352	146.7	11	3,551	4,908	138.2	95	10,607	15,260	143.9
Pennsylvania	1,927	220,020	227,748	103.5	123	52,275	42,765	81.8	2,050	272,295	270,513	99.3
Rhode Island	151	6,279	12,910	205.6	7	1,471	2,405	163.5	158	7,750	15,315	197.6

Digitized by Google

South Carolina	164	9,608	14,895	155.0	26	5,746	6,641	115.6	190	15,354	21,536	140.3
South Dakota	55	7,698	6,864	89.2	6	7,454	3,805	51.0	61	15,152	10,669	70.4
Tennessee	279	32,742	28,737	87.8	39	22,603	13,869	61.4	318	55,345	42,606	77.0
Texas	2,067	169,015	128,372	76.0	203	66,197	31,042	46.9	2,270	235,212	159,414	67.8
Utah	145	20,350	14,565	71.6	18	9,143	4,754	52.0	163	29,493	19,319	65.5
Virginia	330	24,270	38,438	158.4	27	9,909	10,648	107.5	357	34,179	49,086	143.6
Washington	76	5,792	8,429	145.5	18	3,944	4,161	105.5	94	9,736	12,590	129.3
West Virginia	318	47,902	36,124	75.4	31	14,940	9,414	63.0	349	62,842	45,538	72.5
Wisconsin	466	44,221	54,154	122.5	30	10,004	10,642	106.4	496	54,225	64,796	119.5
Wyoming	52	9,289	5,626	60.6	9	4,989	2,177	43.6	61	14,278	7,803	54.7
Total: 1959	30,692	2,912,601	2,945,630	101.1	2,608	975,107	703,377	72.1	33,300	3,887,708	3,649,007	93.9
1958	[2] 29,282	2,714,251	2,665,385	98.2	2,405	871,774	605,818	69.5	31,787	3,586,025	3,271,203	91.2

[1] Includes natural gas mixed with manufactured gas.
[2] Less than 500.
[3] 1958 revised: Delaware, District of Columbia, and Maryland should read 708.

Digitized by Google

TABLE 12.—Industrial consumption of natural gas in the United States, 1959, by States and uses

State	Field (pumping, drilling, and other)			Carbon black			Fuel						Total industrial			Fuel used at electric utility plants [1]
	Quantity (million cubic feet)	Value (thousand dollars)	Average value (cents per M c.f.)	Quantity (million cubic feet)	Value at point of consumption		Refinery fuel (million cubic feet)	Natural gas pipeline (million cubic feet)	Other industrial fuel (million cubic feet)	Total fuel (million cubic feet)	Value (thousand dollars)	Average value (cents per M c.f.)	Quantity (million cubic feet)	Value at point of consumption [1]		
					Total (thousand dollars)	Average (cents per M c.f.)								Total (thousand dollars)	Average (cents per M c.f.)	
Alabama	96	10	10.4				841	7,606	113,960	122,407	35,644	29.1	122,503	35,654	29.1	16,124
Alaska	1												1			
Arizona	19	2	10.5					14,677	52,328	67,005	19,057	28.4	67,024	19,059	28.4	44,772
Arkansas	13,031	1,238	9.5				11,150	9,377	138,875	159,402	31,173	19.6	172,433	32,411	18.8	48,646
California	[2] 148,854	[2] 34,461	[2] 23.2	(3)	(3)	(3)	75,481	14,395	542,450	632,326	237,823	37.6	781,180	272,284	34.9	284,779
Colorado	19,433	2,658	13.7				2,689	1,604	93,761	98,054	23,573	24.0	117,487	26,231	22.3	34,705
Connecticut								146	8,821	8,967	8,123	90.6	8,967	8,123	90.6	1,929
Delaware, District of Columbia, and Maryland	3	1	33.3				(3)	911	[3] 21,014	21,925	15,023	68.5	21,928	15,024	68.5	4,466
Florida	34	6	17.6					430	64,830	65,260	19,224	29.5	65,294	19,230	29.5	50,545
Georgia							(3)	3,284	[3] 106,290	109,574	33,463	30.5	109,574	33,463	30.5	37,462
Idaho								242	15,237	15,479	5,664	36.6	15,479	5,664	36.6	
Illinois	20,613	2,689	13.0				12,942	9,995	228,532	251,469	96,480	38.4	272,082	99,169	36.4	64,134
Indiana	82	17	20.7				855	6,415	78,051	85,321	33,842	39.7	85,403	33,859	39.6	5,769
Iowa								8,848	90,924	99,772	30,745	30.8	99,772	30,745	30.8	47,232
Kansas	[2] 24,172	[2] 4,429	[2] 18.3	(3)	(3)	(3)	23,055	43,943	172,802	239,800	48,402	20.2	263,972	52,831	20.0	80,960
Kentucky	15,560	2,555	16.4				(3)	13,694	[3] 44,097	57,791	20,187	34.9	73,351	22,742	31.0	3,549
Louisiana	193,028	24,798	12.8	22,954	2,472	10.8	109,371	33,638	429,977	572,986	107,851	18.8	788,968	135,121	17.1	106,375
Massachusetts								178	21,995	22,173	14,320	64.6	22,173	14,320	64.6	10,510
Michigan	1,172	295	25.2				444	2,188	97,533	100,165	61,364	61.3	101,337	61,659	60.8	1,644
Minnesota							(3)	182	[3] 80,153	80,335	22,999	28.6	80,335	22,999	28.6	41,875
Mississippi	21,155	4,331	20.5				(3)	28,810	[3] 98,731	127,541	31,050	24.3	148,696	35,381	23.8	32,234
Missouri							(3)	8,370	[3] 112,442	120,812	33,971	28.1	120,812	33,971	28.1	33,318
Montana	5,616	532	9.5				2,873	438	14,666	17,977	4,804	26.7	23,593	5,336	22.6	1,011
Nebraska	4,193	483	11.5				(3)	6,544	[3] 64,252	70,796	19,504	27.5	74,989	19,987	26.7	28,862
Nevada									8,063	8,063	4,838	60.0	8,063	4,838	60.0	4,861
New Hampshire									443	443	541	122.1	443	541	122.1	
New Jersey								536	56,014	56,550	27,555	48.7	56,550	27,555	48.7	31,036
New Mexico	121,402	9,651	7.9	50,013	3,777	7.6	1,203	17,442	55,875	74,520	14,674	19.7	245,935	28,102	11.4	33,614
New York	678	265	39.1					2,088	110,666	112,754	69,354	61.5	113,432	69,619	61.4	59,805
North Carolina								1,990	18,297	20,287	9,199	45.3	20,287	9,199	45.3	2,483
North Dakota	9,375	927	9.9				(3)	10	[3] 1,174	1,184	450	38.0	10,559	1,377	13.0	89

Digitized by Google

Ohio	1,129	891	34.6				7,738	7,639	200,941	216,318	111,386	51.5	217,447	111,777	51.4	4,439
Oklahoma	152,856	20,192	13.3				45,987	6,891	86,579	139,457	24,353	17.5	291,813	44,545	15.3	78,277
Oregon								26	16,865	16,891	6,628	39.2	16,891	6,628	39.2	730
Pennsylvania	2,285	1,167	51.1				23,843	15,211	188,432	227,486	120,596	53.0	229,771	121,763	53.0	11,039
Rhode Island								146	3,115	3,261	2,742	84.1	3,261	2,742	84.1	195
South Carolina								989	38,020	39,009	14,579	37.4	39,009	14,579	37.4	22,430
South Dakota								57	8,375	8,432	2,442	29.0	8,432	2,442	29.0	4,222
Tennessee	141	41	29.1				[1]	12,958	[2] 81,018	93,976	30,209	32.1	94,117	30,250	32.1	6,642
Texas	916,410	91,641	10.0	136,699	12,437	9.1	412,817	52,982	1,111,475	1,577,274	268,393	17.0	2,630,383	372,471	14.2	379,283
Utah	4,254	749	17.6				2,714	51	24,889	27,654	7,859	28.4	31,908	8,608	27.0	3,677
Virginia	45	20	44.4					3,272	22,346	25,618	11,446	44.7	25,663	11,466	44.7	1,464
Washington								295	48,619	48,914	20,804	42.5	48,914	20,804	42.5	
West Virginia	40,580	9,902	24.4				789	8,692	78,645	88,126	35,942	40.8	128,706	45,844	35.6	1,162
Wisconsin							[3]	479	[2] 27,673	28,152	16,362	58.1	28,152	16,362	58.1	275
Wyoming	26,631	2,582	9.7				8,325	1,679	8,206	18,210	3,348	18.4	44,841	5,930	13.2	473
Total: 1959	1,737,402	214,987	12.4	214,612	19,732	9.2	752,239	349,348	4,878,329	5,979,916	1,757,986	29.4	7,931,930	1,992,705	25.1	1,627,097
1958	1,604,104	184,609	11.5	211,048	17,877	8.5	681,912	312,221	4,365,338	5,359,471	1,494,209	27.8	7,174,623	1,696,695	23.6	1,372,853

[1] Federal Power Commission. Preliminary; includes gas other than natural impossible to segregate and therefore shown separately.
[2] 4,946 million cubic feet and $1,046,000 in value included in "Field" use to avoid disclosure; included in total "Carbon black."
[3] 9,122 million cubic feet included in "Other industrial fuel" to avoid disclosure; included in total "Refinery fuel."

Digitized by Google

TABLE 13.—Natural gas processed at natural gasoline and cycling plants in the United States, 1955–59, in million cubic feet.

States	1955	1956	1957	1958	1959
Arkansas	56,092	48,233	43,696	42,538	73,503
California	570,806	572,749	564,675	612,389	527,297
Colorado [1]	43,911	49,052	57,759	61,251	101,253
Illinois [2]	165,739	175,618	192,821	200,397	197,246
Kansas	426,533	407,749	426,454	390,814	432,068
Kentucky	[3] 389,696	[3] 406,260	[3] 396,695	[3] 288,907	[3] 375,591
Louisiana	775,761	839,274	865,836	973,299	1,047,481
Michigan	(2)	(2)	(2)	(2)	(2)
Mississippi	140,040	144,227	157,249	171,008	180,583
Montana	(1)	(1)	(1)	(1)	(1)
Nebraska	[4] 18,397	[4] 21,211	[4] 25,159	[4] 35,205	[4] 37,680
New Mexico	467,505	578,468	617,726	563,227	652,976
Ohio	(2)	(2)	(2)	(2)	
Oklahoma	562,749	620,901	618,715	651,077	708,616
Pennsylvania	17,316	13,949	10,974	5,358	2,932
Texas	4,187,003	4,318,004	4,354,756	4,233,619	4,508,288
Utah	(1)	(1)	(1)	(1)	(1)
West Virginia	225,307	181,772	181,390	156,653	215,979
Wyoming	139,098	67,542	64,656	66,802	125,369
Total	8,185,953	[5] 8,445,009	8,578,561	8,452,544	9,186,862

[1] Montana and Utah included in Colorado.
[2] Michigan and Ohio included in Illinois.
[3] Includes gas from transmission lines; previously treated in other States.
[4] North Dakota included in Nebraska.
[5] Revised.

TABLE 14.—Consumption of natural gas used with manufactured gas in the United States in 1959, by States [1]

State	Residential		Commercial		Industrial	Total	
	Number of consumers (thousand)	Quantity (million cubic feet)	Number of consumers (thousand)	Quantity (million cubic feet)	Quantity (million cubic feet)	Quantity (million cubic feet)	Value at point of consumption (thousand dollars)
Connecticut	192	5,968	12	1,178	2,708	9,854	18,382
Indiana	382	28,433	28	6,791	34,129	69,353	54,444
Massachusetts	290	8,210	21	2,480	5,400	16,090	29,120
New Jersey	654	16,000	74	5,650	20,240	41,890	54,080
New York	733	62,067	42	13,302	30,764	106,133	159,515
Pennsylvania	707	57,791	39	6,844	30,013	94,648	91,285
Total: 1959	2,958	178,469	216	36,245	123,254	337,968	406,826
1958	2,879	162,984	196	28,939	96,984	288,907	306,994

[1] Included in tables for consumption of natural gas (tables 10–12).

VALUE AND PRICES

The average value of natural gas at the wellhead in 1959 was 12.9 cents per thousand cubic feet, 1.0 cent higher than in 1958. The average value at point of consumption increased from 46.2 cents in 1958 to 47.7 cents in 1959. The increase was reflected by all classes of consumers.

Digitized by Google

TABLE 15.—Average value of natural gas in the United States, 1958–59, by States, in cents per thousand cubic feet

State	At wells (estimated)		At point of consumption		State	At wells (estimated)		At point of consumption	
	1958	1959	1958	1959		1958	1959	1958	1959
Alabama	9.2	9.7	44.8	48.1	Nebraska	15.0	15.9	46.1	46.2
Alaska	12.0	12.0	-------	16.0	Nevada	-------	-------	73.3	71.9
Arizona	-------	-------	40.2	41.2	New Hampshire	-------	-------	158.0	157.4
Arkansas	8.1	8.7	26.9	27.3	New Jersey	-------	-------	150.5	140.4
California	23.3	24.6	52.1	52.4	New Mexico	10.4	10.0	16.1	17.1
Colorado	10.5	11.0	32.4	40.2	New York	30.6	30.5	124.9	132.5
Connecticut	-------	-------	172.1	166.4	North Carolina	-------	-------	74.9	82.1
Delaware	-------	-------	94.7	94.6	North Dakota	9.7	9.9	31.6	33.6
District of Columbia	-------	-------	139.6	147.0	Ohio	21.4	23.2	65.5	66.3
Florida	13.6	14.3	31.7	59.6	Oklahoma	10.1	10.0	24.5	25.4
Georgia	-------	-------	49.8	51.3	Oregon	-------	-------	80.8	79.6
Idaho	-------	-------	44.4	48.3	Pennsylvania	28.3	29.2	73.7	78.1
Illinois	14.8	13.9	69.1	71.0	Rhode Island	-------	-------	166.0	164.0
Indiana	15.6	19.0	68.0	68.1	South Carolina	-------	-------	66.1	66.4
Iowa	-------	-------	51.2	52.5	South Dakota	-------	-------	54.8	55.6
Kansas	11.4	12.0	29.4	29.2	Tennessee	16.7	16.7	50.0	48.7
Kentucky	24.1	23.7	53.3	52.0	Texas	10.0	10.8	17.5	18.6
Louisiana	12.9	15.4	19.0	23.3	Utah	14.7	14.2	45.3	45.5
Maryland	26.9	27.0	127.3	130.6	Virginia	27.0	26.2	100.4	101.2
Massachusetts	-------	-------	163.3	160.5	Washington	-------	-------	55.0	56.9
Michigan	18.6	23.0	80.3	82.9	West Virginia	24.8	26.0	48.7	47.7
Minnesota	-------	-------	59.3	59.3	Wisconsin	-------	-------	102.9	98.5
Mississippi	13.9	15.5	32.6	33.3	Wyoming	8.4	8.1	23.8	23.2
Missouri	-------	-------	52.9	52.7					
Montana	6.8	7.5	38.4	41.6	Total	11.9	12.9	46.2	47.7

WORLD PRODUCTION

Marketed production of natural gas, by country, has been compiled in million cubic feet for the first time by the Bureau of Mines. The data are comparable to Bureau of Mines natural-gas statistics as far as possible, i.e., marketed production. Excludes gas used for repressuring and gas flared, vented, or otherwise wasted.

569112—60——21

Digitized by Google

TABLE 16.—Marketed production of natural gas, by countries,[1] 1955–59, in million cubic feet, @ 60°F. (16.67°C.) and normal atmospheric pressure

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country [1]	1955	1956	1957	1958	1959
North America:					
Barbados	133	125	108	98	96
Canada	150,772	169,153	220,007	337,804	433,193
Mexico [2]	126,590	132,258	173,262	277,587	329,363
Trinidad	17,590	19,319	21,202	23,403	34,850
United States	9,405,351	10,081,923	10,680,258	11,030,298	12,046,118
South America:					
Argentina [2]	39,732	42,834	52,782	61,721	(3)
Bolivia	224	262	299	224	(3)
Brazil [2]	2,309	3,130	5,866	11,213	15,948
Chile	17,407	21,913	29,723	49,858	67,746
Colombia [2]	20,153	23,287	23,736	29,557	(3)
Peru [2]	29,435	29,914	37,510	33,762	(3)
Venezuela	102,577	111,749	135,241	146,692	156,435
Europe:					
Austria	28,595	27,801	28,307	30,613	42,098
Belgium	(3)	(3)	3,247	(3)	(3)
Czechoslovakia	6,454	10,238	28,805	46,486	(3)
France	10,231	12,335	20,630	39,540	94,196
Germany, West	8,941	13,683	13,328	12,832	14,465
Hungary [2]	20,340	16,868	15,338	13,996	12,360
Italy	135,369	166,645	186,118	193,156	228,307
Netherlands	5,412	6,307	6,196	7,763	10,788
Poland	14,678	16,287	15,641	14,334	15,534
Rumania	148,243	163,235	172,895	189,410	215,798
U.S.S.R.	335,168	450,345	693,524	1,048,117	[4] 1,824,864
Yugoslavia	1,257	1,437	1,550	1,719	1,866
Asia:					
Burma	[4] 120	231	225	325	178
Brunei	2,867	3,054	2,824	2,757	(3)
Indonesia [2] [4]	71,207	76,320	80,910	77,775	(3)
Iran	(3)	15,552	25,578	26,288	32,055
Japan [2]	5,804	6,598	9,092	13,730	18,831
Pakistan	1,376	10,441	15,349	19,308	22,365
Saudi Arabia	4	(3)	(3)	(3)	(3)
Taiwan	969	1,015	1,073	979	983
Africa:					
Algeria (Sahara)				4,063	6,699
Gabon, Republic of			75	729	1,498
Morocco	282	273	126	69	154
Tunisia	165	218	225	217	236
Union of South Africa	9	6	(3)	(3)	(3)
Oceania: New Zealand	5	8	7	5	6

NOTE: The data relate, as far as possible, to natural gas actually collected and utilized as fuel or raw material. They exclude gas used for repressuring, as well as gas flared, vented, or otherwise wasted whether or not it has first been processed for extraction of natural gasoline. For countries reporting in the metric system, the following conversion factor will be used:

$$m^3 \text{ at } 32° \text{ F. } (0° \text{ C.}) \times 37.32 = ft.^3 \text{ at } 60° \text{ F.}$$
$$(ft.^3 \text{ at } 60° \text{ F.} \times 0.026795 = m^3 \text{ at } 32° \text{ F.})$$

[1] Natural gas is produced in China but there is no recent information available.
[2] Total production.
[3] Data not available.
[4] Estimate.

Digitized by Google

Natural Gas Liquids

By I. F. Avery,[1] W. G. Messner,[2] B. D. Furgang,[3] and E. R. Eliff [4]

Contents

	Page		Page
General summary	315	Shipments of natural gas liquids from plants and terminals	321
Scope of report	315	Sales of liquefied petroleum gases and ethane	326
Reserves	317	Stocks	332
Production	317	Prices	333
Natural gas processed, yield, and number of plants	319	Foreign trade	334

GENERAL SUMMARY

DOMESTIC production of natural gas liquids in 1959 increased 9 percent to 13,472 million gallons. The entire expansion was in the LP-gases (liquefied petroleum gases) and ethane components, the output of which rose 16 percent. Output of natural gasoline decreased 3 percent, whereas output of all other products, including finished gasoline and naptha, increased 11 percent. Sales of LP-gases and ethane in 1959, including the components from natural gas liquids and from refinery output (liquefied refinery or LR-gases), for uses other than blending into gasoline, increased 20 percent to 8,919 million gallons.

SCOPE OF REPORT

Statistics on natural gas liquids are collected by the Bureau of Mines from reports submitted by natural gasoline plants, cycling plants, and fractionators that handle natural gas liquids. Information on production, stocks, and distribution is obtained from monthly reports. Annual reports provide data on type of plant, production, value of production, and volume of gas processed. Reports submitted to the Bureau cover all except the small volume of natural gas liquids recovered at pipeline compressor stations and gas dehydration plants. Such recovery is considered to be of little significance in the National and State totals. Plant condensate is included in the category of

[1] Commodity-industry analyst.
[2] Business analyst.
[3] Statistical clerk.
[4] Statistical assistant.

Digitized by Google

natural gas liquids. Field condensate, however, is reported with crude oil and is excluded from the total for natural gas liquids.

Data on sales of LP-gases are collected by the Bureau of Mines from annual reports received from all producers and distributors and from most of the dealers that sell over 100,000 gallons of LP-gases annually. The reported sample of dealer sales is expanded by Petroleum Administration for War (P.A.W.) districts on the basis of domestic demands in the districts. Data on sales of LP-gases used as fuels or chemicals include data on ethane and liquefied gas produced at natural gasoline plants and at petroleum refineries; they exclude, however, data on LP-gases blended into motor fuel.

Liquefied gases and ethane (whether obtained from natural gas or processing in refineries) are defined as follows:

Ethane.—Includes all ethane, ethylene, and mixtures containing more than 50 percent of either or both.

Propane.—Includes all product covered by NGAA specifications for commercial propane.

Butane-propane mixture.—Includes all product covered by NGAA specifications for commercial butane-propane mixtures.

Butanes.—Includes all product covered by NGAA specifications for commercial butane, except those that contain 60 percent or more isobutane.

Isobutane.—Includes all product covered by NGAA specifications for commercial butane that contain 60 percent or more isobutane.

Other mixtures of liquefied petroleum gases.—Includes mixtures that cannot be classified within the above four classifications, such as mixtures containing less than 50 percent ethane but more than 50 percent propane and butane.

TABLE 1.—Salient statistics of the natural-gas-liquids industry in the United States, 1955–59, in thousand gallons

	1955	1956	1957	1958	1959
Production:					
Natural gasoline and isopentane	4,457,079	4,438,890	4,499,495	4,355,025	4,222,266
LP-gases and ethane	5,972,698	6,487,413	6,655,282	6,783,000	7,874,706
Finished gasoline and naphtha	823,103	832,915	779,807	701,456	660,666
Other products	564,722	535,295	455,005	539,977	714,170
Total	11,817,602	12,294,513	12,389,589	12,379,458	13,471,808
Shipments for use in gasoline [1]	7,059,737	6,990,389	7,241,831	6,904,179	7,067,963
Transfers to nongasoline uses:					
LP-gases and ethane [2]	4,549,681	4,796,743	4,915,211	5,174,140	6,149,430
Other products	220,107	207,768	181,011	191,077	158,708
Stocks at plants, terminals, and refineries:					
Natural gasoline	165,799	194,757	168,244	[3] 198,284	170,058
LP-gases	300,129	587,094	568,601	[3] 664,705	790,579
Other products	103,775	81,627	109,727	[3] 92,595	84,606
Total	569,703	863,478	846,572	[3] 955,584	1,045,243
Value of natural gas liquids at plants thousand dollars	619,006	697,143	679,456	689,710	758,496
Average value per gallon cents	5.2	5.7	5.5	5.6	5.6
Natural gas processed million cubic feet	8,185,953	8,590,163	8,578,561	8,452,544	9,186,862
Average yield, all natural gas liquids gallons per M cubic feet	1.44	1.43	1.44	1.46	1.47
Sales for fuel and chemical uses:					
Liquefied petroleum gas and ethane	4,227,711	4,528,356	4,780,141	5,054,271	6,047,061
Liquefied refinery gas and ethane	1,768,772	2,107,407	2,158,980	2,407,818	2,872,100
Total	5,996,483	6,635,763	6,939,121	7,462,089	8,919,161
Exports of natural gasoline, LP-gases, and LR-gases	183,155	187,882	192,505	120,017	94,620

[1] Includes exports of natural gasoline.
[2] Includes exports of LP-gases.
[3] Revised.

Digitized by Google

RESERVES

The American Gas Association Reserves Committee estimated proved recoverable reserves of natural gas liquids in the United States on December 31, 1959, at 6,522 million barrels—an increase of 318 million barrels, or 5 percent, over yearend 1958. Texas and Louisiana, including the offshore areas of these States, accounted for 53 percent and 21 percent, respectively, of the total estimated reserves. Estimates of reserves in Louisiana increased appreciably during the year, rising 162 million barrels, or 14 percent, above the estimate at the end of 1958. Estimates of reserves in Utah increased 117 percent, owing to the construction of a gasoline plant in the Aneth field.

PRODUCTION

Of the 13,472 million gallons of natural gas liquids produced in 1959, 59 percent was LP-gases and ethane, 31 percent natural gasoline and isopentane, 5 percent finished gasoline and naphtha, and 5 percent other products. Most of the 9-percent increase in production in 1959 was LP-gases and ethane, output of which rose 16 percent. Part of this increase is attributed to more complete data on ethane, which was reported separately for the first time in 1959. Heretofore, ethane production was reported with other LP-gas mixtures. Output of natural gasoline and isopentane decreased 3 percent, and output of finished gasoline and naphtha declined 6 percent. Production of LP-gases is reported by product and State for the first time in table 9. Production of liquefied refinery gases and ethane (LR-gas) in 1959 was 2,885 million gallons.

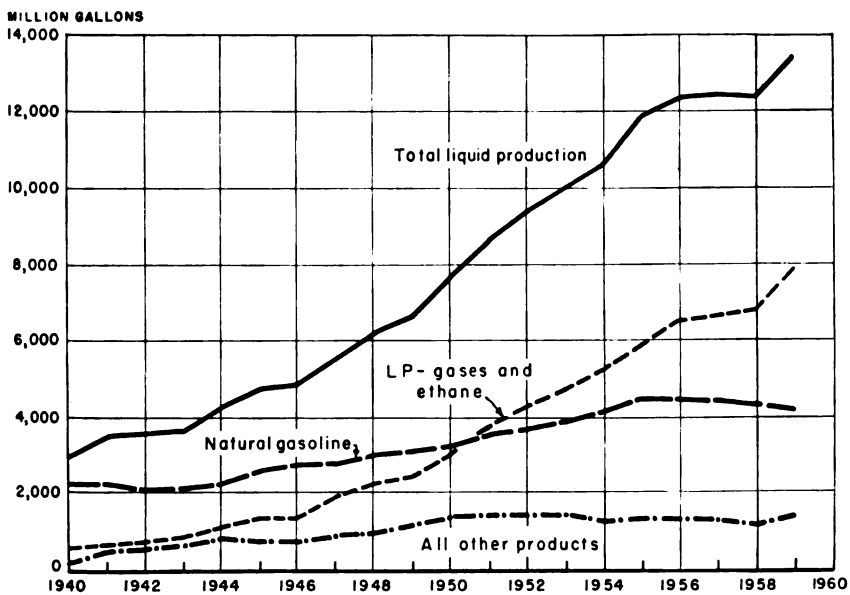

FIGURE 1.—Production of natural gas liquids in the United States, 1940–59.

Digitized by Google

TABLE 2.—Estimated proved recoverable reserves of natural gas liquids[1] in the United States, 1958–59, in thousand barrels

[Committee on Natural Gas Reserves, American Gas Association]

State	Reserves as of Dec. 31, 1958	Changes in reserves during 1959			Reserves as of Dec. 31, 1959			
		Extensions and revisions	Discoveries of new fields and new pools in old fields	Net production	Nonassociated with oil	Associated with oil	Dissolved in oil	Total
Arkansas	34,150	148	302	2,583	4,646	17,333	10,038	32,017
California[2]	302,319	51,572	535	29,108	0	106,274	219,044	325,318
Colorado	21,268	7,273	78	3,705	7,095	1,974	15,845	24,914
Illinois	10,950	111	1,250	1,557	55	0	10,699	10,754
Indiana	119	23	1	19	6	7	111	124
Kansas	199,552	3,210	623	6,473	185,057	7,666	4,189	196,912
Kentucky	37,472	13,612	1,492	3,286	[3] 49,290	0	0	49,290
Louisiana[2]	1,195,955	203,094	32,201	73,452	1,107,916	210,448	39,434	1,357,798
Michigan	1,502	189	27	156	581	276	705	1,562
Mississippi	55,182	−12,286	721	2,673	26,301	8,272	6,371	40,944
Montana	7,497	6,667	0	653	1,861	0	11,650	13,511
Nebraska	5,699	516	0	783	4,011	618	803	5,432
New Mexico	417,238	16,004	8,886	19,088	285,377	39,492	98,171	423,040
North Dakota	31,239	68,108	0	1,419	0	16,400	81,528	97,928
Ohio	1,618	−314	0	0	[3] 1,304	0	0	1,304
Oklahoma	357,507	34,481	3,900	28,319	149,407	52,914	165,248	367,569
Pennsylvania	3,685	40	20	68	[3] 3,677	0	0	3,677
Texas[2]	3,391,967	184,496	57,225	203,313	1,527,089	619,532	1,283,754	3,430,375
Utah	14,899	17,948	0	471	133	0	32,243	32,376
West Virginia	63,286	−28,185	2,171	3,106	[3] 34,166	0	0	34,166
Wyoming	50,876	27,215	107	4,919	29,943	1,294	42,042	73,279
Alabama, Florida, and Missouri	38	−17	0	3	0	0	18	18
Total	6,204,018	593,905	109,539	385,154	3,417,915	1,082,500	2,021,893	6,522,308

[1] Comprises natural gasoline, LP-gases, and condensate.
[2] Includes offshore reserves.
[3] Not allocated by types, but occurring principally in column shown.

Digitized by Google

NATURAL GAS PROCESSED, YIELD, AND NUMBER OF PLANTS

A reported 198 operators were producing natural gas liquids at 555 plants at the end of 1959—2 plants less than the revised figure for plants operating at the end of 1958. In 1959 the number of absorption plants decreased by 12, and the number of compression and refrigeration type plants increased by 10. The quantity of natural

TABLE 3.—Natural gas liquids produced, value at plants, and gas processed in the United States, 1959, by States

State	Number of operators [3]	Natural gasoline [1]			LP-gases and ethane			Finished gasoline and naphtha		
		Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon
Arkansas	7	37,643	2,280	6.1	55,731	3,048	5.5	2,236	200	8.9
California	26	768,649	62,434	8.1	396,331	21,260	5.4			
Colorado	8	47,250	2,799	5.9	77,637	3,671	4.7			
Illinois [5]	6	18,985	1,424	7.5	344,880	19,680	5.7	1,138	112	
Kansas	12	107,456	5,552	5.2	124,874	6,658	5.3			
Kentucky	6	35,528	2,085	5.9	213,171	12,267	5.8			
Louisiana	35	291,815	18,742	6.4	540,046	25,877	4.8	196,295	15,457	7.9
Mississippi	4	19,822	1,234	6.2	8,141	465	5.7			
Montana [7]	4	18,091	1,024	5.7	49,964	2,336	4.7			
Nebraska [8]	4	24,124	1,743	7.2	82,323	4,481	5.4			
New Mexico	11	243,740	15,420	6.3	552,257	22,320	4.0			
Oklahoma	38	442,360	28,974	6.5	675,869	27,070	4.0	2,468	244	9.9
Pennsylvania	4	2,884	184	6.4	1,484	36	2.4			
Texas	103	2,073,051	140,854	6.8	4,353,368	181,148	4.2	458,529	40,504	8.8
West Virginia	9	29,242	1,808	6.2	308,316	15,534	5.0			
Wyoming	9	61,626	3,754	6.1	90,314	3,951	4.4			
Total	198	4,222,266	290,311	6.9	7,874,706	349,802	4.4	660,666	56,517	8.6

State	Number of operators [3]	Other products [2]			Total natural gas liquids			Natural gas processed	
		Thousand gallons	Thousand dollars	Cents per gallon	Thousand gallons	Thousand dollars	Cents per gallon	Million cubic feet	Average yield (gallons per M cubic feet)
Arkansas	7	851	43	5.1	96,461	5,571	5.8	73,503	1.34
California	26	65,609	5,589	8.5	[4] 1,230,589	89,283	7.3	527,297	2.33
Colorado	8	174	12	6.9	125,061	6,482	5.2	49,241	2.54
Illinois [5]	6				365,003	21,216	5.8	[6] 197,246	1.85
Kansas	12	358	24	6.7	232,688	12,234	5.3	432,068	.54
Kentucky	6	340	48	14.1	249,039	14,400	5.8	[6] 375,591	.66
Louisiana	35	358,000	26,096	7.3	1,386,156	86,172	6.2	1,047,481	1.32
Mississippi	4	3,385	261	7.7	31,348	1,960	6.3	180,583	.17
Montana [7]	4				68,055	3,360	4.9	52,012	1.31
Nebraska [8]	4				106,447	6,224	5.8	37,680	2.83
New Mexico	11	20,393	1,439	7.1	816,390	39,179	4.8	652,976	1.25
Oklahoma	38	3,525	225	6.4	1,124,222	56,513	5.0	708,616	1.59
Pennsylvania	4				4,368	220	5.0	2,932	1.49
Texas	103	258,575	27,880	10.8	7,143,523	390,386	5.5	4,508,288	1.58
West Virginia	9				337,558	17,342	5.1	215,979	1.56
Wyoming	9	2,960	249	8.4	154,900	7,954	5.1	125,369	1.24
Total	198	714,170	61,866	8.7	13,471,808	758,496	5.6	9,186,862	1.47

[1] Includes isopentane.
[2] Includes condensate, kerosine, jet fuel, distillate fuel, etc.
[3] A producer operating in more than 1 State is counted but once in arriving at total for United States.
[4] California total natural gas liquids production for 1958 in 1958 Yearbook should read 1,196,037 thousand gallons.
[5] Michigan (2 operators) included in Illinois.
[6] Includes gas from transmission lines, previously treated in another State.
[7] Utah (2 operators) included in Montana.
[8] North Dakota (1 operator) included in Nebraska.

Digitized by Google

TABLE 4.—Monthly production of natural gas liquids in the United States, 1959, by States and districts,[1] in thousand gallons

State and district	January	February	March	April	May	June	July	August	September	October	November	December	Total
West Pennsylvania	501	424	449	357	290	434	235	282	261	332	331	472	4,368
West Virginia	20,582	21,875	23,138	27,902	26,911	30,444	31,035	31,190	31,237	31,703	30,686	30,855	337,558
Illinois	27,423	26,644	31,455	32,769	28,810	28,734	33,615	33,939	30,208	27,931	29,416	31,859	362,803
Kentucky and Michigan	21,269	20,895	23,725	23,507	21,317	17,458	18,913	19,866	20,109	21,684	21,409	21,087	251,239
Kansas	23,715	21,915	20,615	18,932	16,703	15,451	15,639	14,859	16,450	20,296	23,453	24,660	232,688
Nebraska and North Dakota	9,460	9,216	8,788	7,741	8,125	7,844	8,057	9,289	9,630	7,988	9,715	10,594	106,447
Oklahoma	94,080	92,122	95,518	92,334	91,377	91,015	90,131	90,131	89,786	95,716	98,345	103,667	1,124,222
Texas:													
Gulf	141,084	124,295	136,230	131,976	136,928	133,227	133,034	131,926	126,373	133,992	137,783	145,333	1,612,181
East Texas	22,644	21,837	24,162	24,324	26,537	20,697	19,886	19,580	19,195	19,259	17,878	18,821	254,820
Panhandle	98,720	98,742	108,048	98,075	96,754	88,364	87,022	88,309	90,600	108,070	112,177	119,261	1,194,142
West Texas	202,141	189,548	199,331	189,469	209,062	199,119	197,373	209,240	197,482	203,312	196,609	202,672	2,395,358
Rest of State	149,036	136,681	147,714	141,892	138,812	136,565	137,526	135,100	132,674	140,085	142,355	148,582	1,687,022
Total Texas	613,625	571,103	615,485	585,736	608,093	577,972	574,841	584,155	566,324	604,718	606,802	634,669	7,143,523
Arkansas	8,047	6,997	8,400	7,867	8,288	7,830	5,473	7,785	8,213	8,595	8,842	10,124	96,461
Louisiana:													
Gulf	58,997	55,186	64,716	62,319	59,701	60,041	64,345	62,639	61,561	64,853	66,973	70,099	751,430
Inland	50,881	45,179	54,983	48,749	48,688	54,198	56,761	56,334	52,754	54,104	56,307	55,788	634,726
Total Louisiana	109,878	100,365	119,699	111,068	108,389	114,239	121,106	118,973	114,315	118,957	123,280	125,887	1,386,156
Mississippi	2,716	2,319	4,434	4,019	2,171	2,066	2,249	2,369	2,300	2,149	2,139	2,417	31,348
New Mexico	58,823	60,225	65,597	62,766	65,374	62,736	67,194	69,225	73,190	75,371	70,097	85,792	816,390
Colorado	10,325	9,625	10,448	9,747	10,437	10,120	10,897	11,281	10,761	10,610	10,252	10,618	125,061
Montana and Utah	6,249	5,812	5,623	5,365	5,689	5,113	5,904	5,356	5,266	5,924	5,864	5,881	68,055
Wyoming	10,103	9,317	10,172	9,525	12,539	18,900	12,452	12,143	13,169	15,026	15,426	16,128	154,900
California	104,205	93,771	103,531	99,019	103,686	99,553	102,049	104,031	101,678	105,860	104,645	108,561	1,230,589
Total United States	1,121,001	1,052,634	1,147,077	1,098,654	1,118,199	1,089,909	1,099,790	1,114,874	1,092,837	1,152,860	1,160,702	1,223,271	13,471,808

[1] West Pennsylvania separated from eastern part of State to allow grouping either in a Bureau of Mines refinery district or Petroleum Administration for War district. Districts shown for Texas and Louisiana are Bureau of Mines production districts.

Digitized by Google

gas processed during the year was 9,187 billion cubic feet, or about 9 percent more than in 1958. The average yield of natural gas liquids (1.47 gallons per thousand cubic feet) remained almost unchanged from 1958.

SHIPMENTS OF NATURAL GAS LIQUIDS FROM PLANTS AND TERMINALS

Shipments of natural gas liquids from plants and terminals totaled 13,376 million gallons in 1959, an increase of 8 percent over 1958.

For Motor-Fuel Use.—Total shipments of natural gas liquids for blending into motor fuel increased 2 percent. The proportion of natural gas liquids used in refinery gasoline increased from 9.7 percent (revised) in 1958 to 10.4 percent. The only outstanding change in the amount used for blending was in the Arkansas and Louisiana Inland district, where the proportion increased from 4.6 percent in 1957 to 13.1 percent in 1958 and to 25.3 percent in 1959, owing to a new refinery in this district that used a high percentage of natural gas liquids.

For Non-Motor-Fuel Use.—Shipments of LP-gases for use as fuels and chemicals continued their upward trend, increasing 19 percent in 1959. For discussion of sales of LP-gases for fuel and chemical use see page 326.

TABLE 5.—Natural gas liquids produced in the United States in 1959, by States and methods of manufacture

State	Number of plants operating Dec. 31, 1959				Production (thousand gallons)			
	Compression [1]	Absorption [2]	Cycling [3]	Total	Compression	Absorption	Cycling	Total
Arkansas	----------	6	1	7	----------	(4)	(4)	96,461
California	3	61	3	67	3,648	1,072,453	154,488	1,230,589
Colorado [5]	4	10	1	15	(4)	(4)	(4)	193,116
Illinois [6]	2	4	--------	6	(4)	(4)	----------	365,003
Kansas	1	13	--------	14	(4)	(4)	----------	232,688
Kentucky	1	5	--------	6	(4)	(4)	----------	249,039
Louisiana	6	35	13	54	50,070	[7] 700,426	635,660	1,386,156
Mississippi	1	2	1	4	(4)	(4)	(4)	31,348
Nebraska [8]	----------	5	--------	5	----------	106,447	----------	106,447
New Mexico	4	20	--------	24	30,853	785,537	----------	816,390
Oklahoma	5	63	2	70	5,760	1,043,761	74,701	1,124,222
Pennsylvania	3	3	--------	6	177	4,191	----------	4,368
Texas	16	190	26	232	223,450	[7] 5,781,078	1,138,995	7,143,523
West Virginia	27	7	--------	34	186,957	150,601	----------	337,558
Wyoming	1	10	--------	11	(4)	(4)	----------	154,900
Total: 1959	74	434	47	555	571,515	10,858,890	2,041,403	13,471,808
1958	[9] 64	[9] 446	[9] 47	[9] 557	457,023	10,069,134	1,853,301	12,379,458

[1] Includes 29 plants manufacturing LP-gases; 1 refrigeration-type plant each in Kansas, Mississippi, and West Virginia; 2 refrigeration-type plants each in California, Colorado, and Louisiana; 4 refrigeration-type plants in New Mexico; and 8 refrigeration-type plants in Texas.

[2] Includes combination of absorption with compression process. Includes 315 plants manufacturing LP-gases.

[3] Includes 45 plants manufacturing LP-gases.

[4] Included in State total production and U.S. total production to avoid disclosing individual company operations.

[5] Montana (2 absorption plants) and Utah (1 absorption and 1 drip gasoline) included in Colorado.

[6] Michigan (2 compression plants) included in Illinois.

[7] Includes some drip gasoline.

[8] North Dakota (1 absorption plant) included in Nebraska.

[9] Revised.

Digitized by Google

TABLE 6.—Supply and distribution at plants and terminals [1] of natural gas liquids in the United States, 1959, by months, in thousand gallons

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Production:													
Natural gasoline	310,345	291,545	322,989	311,208	338,972	328,713	336,487	338,118	320,743	338,670	324,876	329,889	3,892,555
Ethane	34,927	35,624	37,353	41,355	40,348	41,875	44,556	43,324	43,853	41,552	45,004	43,990	493,761
LP-gases:													
Propane	327,936	305,946	319,728	295,213	284,724	274,320	270,347	290,453	289,587	329,872	343,535	367,190	3,698,851
Butane, normal	163,409	160,609	178,127	169,410	174,825	172,788	164,823	156,081	165,031	171,002	171,032	182,871	2,030,008
Isobutane	56,441	52,322	55,065	53,487	54,380	52,207	54,024	54,156	55,857	57,294	61,114	59,993	666,340
Butane-propane mixture	64,777	51,680	61,984	60,233	57,638	55,030	58,411	67,824	49,839	45,896	47,923	61,720	682,955
Other LP-gas mixtures	20,571	22,578	24,574	22,773	28,655	28,368	27,904	27,184	24,378	25,543	23,718	26,545	302,791
Isopentane	26,490	26,764	30,074	29,346	28,094	26,567	29,291	26,166	27,158	27,665	24,534	27,562	329,711
Finished gasoline and naphtha	66,704	59,517	55,157	54,053	52,044	49,376	54,273	54,298	52,133	54,080	53,563	55,468	660,666
Condensate, raw	34,937	32,811	48,085	48,606	45,127	45,344	46,829	43,486	51,081	49,763	51,876	55,353	553,298
Other products	14,464	13,238	13,941	12,970	13,392	15,321	12,845	13,784	13,177	11,523	13,527	12,690	160,872
Total	1,121,001	1,052,634	1,147,077	1,098,654	1,118,199	1,089,909	1,099,790	1,114,874	1,092,837	1,152,860	1,160,702	1,223,271	13,471,808
Stock change at plants and terminals	−204,052	−17,929	+77,893	+142,399	+197,134	+118,723	+56,189	+26,120	+33,317	−30,923	−122,148	−181,016	+95,707
Shipments:													
For use in gasoline:													
Natural gasoline	309,029	281,578	315,370	310,996	328,496	320,789	360,712	357,843	327,116	336,967	329,982	335,688	3,914,566
LP-gases:													
Propane	2,856	3,234	4,242	3,864	2,268	3,444	5,838	5,754	7,980	27,342	10,584	9,912	87,318
Butane, normal	87,830	79,082	74,300	54,559	48,282	42,942	47,613	53,316	61,732	66,681	89,372	86,970	792,679
Isobutane	50,266	42,130	54,136	38,723	49,872	60,546	61,125	58,530	54,566	52,977	61,072	70,026	653,969
Butane-propane mixture	1,092	420	504	462	336	336	420	252	378	210	----------	4,704	9,114
Other LP-gas mixtures	6,174	4,956	4,578	4,746	6,342	4,704	2,688	3,864	3,570	3,402	1,092	3,822	49,938
Isopentane	29,514	23,985	32,951	33,018	28,157	27,606	28,866	27,499	27,087	26,920	23,986	26,799	336,388
Finished gasoline and naphtha	59,647	55,364	63,446	58,042	52,433	53,638	60,546	51,788	57,076	51,313	55,073	51,836	670,202
Condensate	34,281	31,525	47,337	48,050	46,465	44,611	47,591	47,709	52,352	49,143	50,384	54,341	553,789
For other uses:													
Ethane	34,927	35,473	37,504	41,456	40,348	41,873	44,557	42,566	44,609	40,955	42,260	44,490	491,018
LP-gases: [2]													
Propane	517,497	362,753	260,067	216,825	164,384	163,458	175,000	246,349	229,315	313,790	416,978	480,664	3,547,080
Butane, normal	87,295	77,172	72,355	57,510	70,126	112,882	115,093	93,992	115,167	133,090	119,205	125,890	1,179,777
Isobutane [3]	852	714	918	657	845	1,026	1,036	993	925	898	1,035	1,187	11,086

Digitized by Google

Butane-propane mixture	75,329	43,546	63,443	56,747	52,273	59,776	57,731	67,551	46,001	44,497	45,665	64,053	676,612
Other LP-gas mixtures	14,193	17,259	19,844	17,954	18,533	20,126	21,286	20,421	21,003	22,353	24,585	26,300	243,857
Other products	14,271	11,372	18,189	12,646	11,905	13,429	13,499	10,327	10,643	13,245	11,577	17,605	158,708
Total demand at plants and terminals	1,325,053	1,070,563	1,069,184	956,255	921,065	971,186	1,043,601	1,088,754	1,059,520	1,183,783	1,282,850	1,404,287	13,376,101

[1] Terminals owned by producers.

[2] Includes LP-gas exports.

[3] Reported on LP-gas sales report for chemical use.

Digitized by Google

TABLE 7.—Natural gas liquids utilized at refineries in the United States, 1959, by Bureau of Mines refinery districts and by months, in thousand gallons

District	January	February	March	April	May	June	July
East Coast	14,364	8,862	5,250	7,140	6,132	4,872	7,434
Appalachian				126	546	924	882
Indiana, Illinois, Kentucky, etc.	43,050	34,272	39,774	31,206	31,794	31,710	35,616
Minnesota, Wisconsin, North Dakota, and South Dakota	1,974	2,058	2,142	1,974	1,470	1,470	2,058
Oklahoma, Kansas, Missouri	57,414	57,792	56,322	49,812	44,478	51,786	49,392
Texas:							
Inland	79,128	71,820	103,320	94,584	102,480	110,586	111,426
Gulf Coast	151,368	142,926	172,032	161,154	170,478	169,134	176,274
Total Texas	230,496	214,746	275,352	255,738	272,958	279,720	287,700
Louisiana-Arkansas:							
Louisiana Gulf Coast	51,072	52,038	52,920	44,982	50,400	48,846	52,542
Arkansas, Louisiana Inland	13,146	14,070	13,986	12,936	14,112	12,936	10,542
Total Louisiana-Arkansas	64,218	66,108	66,906	57,918	64,512	61,782	63,084
Rocky Mountain	11,088	9,072	11,256	9,618	11,886	12,054	11,718
West Coast	78,918	73,878	84,126	85,512	84,420	84,966	87,654
Total United States	501,522	466,788	541,128	499,044	518,196	529,284	545,538

District	August	September	October	November	December	Total
East Coast	7,224	4,788	5,796	11,214	10,920	93,996
Appalachian	840	546	462			4,326
Indiana, Illinois, Kentucky, etc.	41,328	48,132	49,728	51,954	64,680	503,244
Minnesota, Wisconsin, North Dakota, and South Dakota	2,730	2,856	1,554	2,436	2,520	25,242
Oklahoma, Kansas, Missouri	52,332	52,248	56,280	54,810	59,766	642,432
Texas:						
Inland	103,908	103,194	89,628	88,452	84,966	1,143,492
Gulf Coast	181,860	171,906	198,114	188,076	195,090	2,078,412
Total Texas	285,768	275,100	287,742	276,528	280,056	3,221,904
Louisiana-Arkansas:						
Louisiana Gulf Coast	54,684	47,796	58,926	60,774	62,664	637,644
Arkansas, Louisiana Inland	12,096	12,222	12,558	12,684	14,868	156,156
Total Louisiana-Arkansas	66,780	60,018	71,484	73,458	77,532	793,800
Rocky Mountain	14,658	13,104	13,650	16,716	16,926	151,746
West Coast	85,344	78,078	90,090	85,932	83,958	1,002,876
Total United States	557,004	534,870	576,786	573,048	596,358	6,439,566

Digitized by Google

TABLE 8.—Percentage of natural gas liquids in refinery gasoline [1] in the United States, 1955–59, by Bureau of Mines refinery districts

Year	East Coast	Appalachian	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, North Dakota, and South Dakota	Oklahoma, Kansas, Missouri, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas, Louisiana Inland	Rocky Mountain	West Coast	Total
1955	1.9	.8	5.8	[2]	9.7	33.8	10.2	5.9	5.4	5.5	16.6	9.5
1956	1.4	.3	5.8	1.5	10.1	34.2	10.9	9.4	4.7	5.1	15.1	9.7
1957	1.3	[3]	5.6	1.5	9.7	34.3	12.7	17.6	4.6	5.8	14.0	10.6
1958	[4] 1.3	[3]	4.8	1.7	9.3	[4] 34.8	[4] 13.4	[4] 8.4	13.1	5.6	[4] 13.4	[4] 9.7
1959	1.2	[3]	4.4	3.3	10.6	35.6	14.4	11.1	25.3	6.7	12.5	10.4

[1] Refinery gasoline excludes jet fuel.
[2] Minnesota, Wisconsin, North Dakota, and South Dakota district not shown separately before 1956.
[3] Less than 0.05 percent.
[4] Revised figure.

TABLE 9.—Liquified petroleum gas and ethane produced at natural gasoline and cycling plants in 1959, in thousand gallons

States and areas	Propane	Butane-propane mix	Butane	Isobutane	Other LP-gas	Total
West Pennsylvania	1,011	473				1,484
West Virginia	20,362		20,059		[1] 267,895	308,316
Illinois	166,700	1,100	6,766	16,060	[1] 152,380	343,006
Kansas	50,749	11,182	47,178	14,823	[1] 942	124,874
Kentucky	102,527		30,821	15,836	[1 2] 65,861	215,045
Michigan					[2]	[2]
Nebraska	[3] 52,180		[3] 30,143			[3] 82,323
North Dakota	[3]		[3]			[3]
Oklahoma	417,736	68,474	150,566	39,059	34	675,869
Arkansas	19,435	21,796	6,489	7,268	743	55,731
Louisiana	265,039	103,995	109,398	54,459	7,155	540,046
Gulf	151,598	23,766	62,553	30,369	7,155	275,441
Inland	113,441	80,229	46,845	24,090		264,605
Mississippi	5,910	655	1,576			8,141
New Mexico	253,680	20,818	253,680	24,079		552,257
Texas	1,965,607	412,447	1,241,688	458,821	[1] 274,805	4,353,368
Gulf	269,760	46,790	186,240	142,216	[1] 164,527	809,533
West	980,879	138,474	555,584	95,952	4,605	1,775,494
East	103,283	13,196	46,464	5,587		168,530
Panhandle	301,124	31,530	288,903	126,758	18,992	767,307
Other	310,561	182,457	164,497	88,308	[1] 86,681	832,504
Colorado	51,771	746	23,870		1,250	77,637
Montana	[4] 33,128	2,663	[4] 14,173			49,964
Utah	[4]		[4]			[4]
Wyoming	49,202		41,112			90,314
California	243,814	38,606	52,489	35,935	25,487	396,331
Total	3,698,851	682,955	2,030,008	666,340	[5] 796,552	7,874,706

[1] Includes ethane production.
[2] Michigan included with Kentucky.
[3] North Dakota included with Nebraska.
[4] Utah included with Montana.
[5] Includes 493,761,000 gallons of ethane production.

Digitized by Google

SALES OF LIQUEFIED PETROLEUM GASES[6] AND ETHANE

Domestic sales of liquefied petroleum gases and ethane (excluding liquefied petroleum gases used in gasoline) continued their upward trend and increased 20 percent in 1959, compared with an 8-percent increase in 1958. Increases and decreases from 1958 in the various sales categories were as follows:

	Percent change
Domestic and commercial	+20
Internal combustion	+4
Industrial	−11
Refinery fuel	−24
Gas manufacture	−24
Chemical manufacture	+33
Synthetic rubber manufacture	+38
Secondary recovery	+235
All other uses	−1

TABLE 10.—Liquefied petroleum gas (LR-Gas) and ethane produced at refineries in 1959 in thousand gallons

States and areas	Propane	Butane-Propane Mix	Butane	Other LR-Gas	Total
East Coast	183,288	462	30,660	[1] 25,494	239,904
West New York	9,828				9,828
Pennsylvania	131,544		5,082	84	136,710
West Virginia				2,394	2,394
Illinois	85,974		6,132	−504	91,602
Indiana	[2]				[2]
Kansas	33,348	13,356	31,752		78,456
Kentucky	[3] 54,516		[3] 2,394		[3] 56,910
Michigan	[2]		[2]		[2]
Minnesota			[3]	[3]	[3]
Missouri	[3]		[3]		[3]
Nebraska	[3] 35,070		[3] 8,190	[3] 168	[3] 43,428
North Dakota	[3]				[3]
Ohio	96,936	42	4,662	588	102,228
Oklahoma	83,412	19,488	21,210	29,526	153,636
Tennessee	[3]				[3]
Alabama	[4]	[4]	[4]		[4]
Arkansas	[4]			[4]	[4]
Louisiana	199,248	28,098	55,188	347,298	629,832
Gulf	199,248	24,612	55,189	[1] 346,962	626,010
Inland		3,486		336	3,822
Mississippi	[4] 15,078	[4] 210	[4] 7,014	[4] 6,636	[4] 28,938
New Mexico	2,394		−168		2,226
Texas	408,114	8,358	347,130	195,986	959,588
Gulf	336,378	7,308	299,880	[1] 194,894	838,460
Inland	71,736	1,050	47,250	1,092	121,128
Colorado	6,048		6,972		13,020
Montana	7,644		2,100		9,744
Utah	19,530		2,226		21,756
Wyoming	2,562		4,620		7,182
California	192,654	3,024	80,430	[1] 21,756	297,864
Total	1,567,188	73,038	615,594	[5] 629,426	2,885,246

[1] Includes ethane production.
[2] Indiana, Michigan, and Tennessee included with Kentucky.
[3] Minnesota, Missouri, and North Dakota included with Nebraska.
[4] Alabama and Arkansas included with Mississippi.
[5] Includes 295,344,000 gallons of ethane production.

[6] LP-gases, as used in this section, include LR-gases. The survey covering sales of LP-gases in the west coast marketing area (P.A.W. district 5) was made by F. A. Moore, Branch of Petroleum Economics, Bureau of Mines, San Francisco, Calif.

Digitized by Google

The unusually large increase for secondary recovery usage resulted from the initiation of a number of large miscible phase displacement projects. Sales of ethane were shown separately for the first time in 1959. Sales of LP-gases in Alaska also were included in the United States totals for the first time.

TABLE 11.—Sales of LP-gas[1] and ethane in the United States, 1955–59, by types, in thousand gallons

Year	Ethane	Percent of total	Propane	Percent of total	Butane	Percent of total	Isobutane	Percent of total
1955	(2)		3,260,571	53.3	724,334	11.8	(2)	
1956	(2)		3,626,189	54.6	888,545	13.4	36,088	0.5
1957	(2)		4,009,144	57.8	1,117,748	16.1	26,721	.4
1958	(2)		4,247,373	56.9	1,119,544	15.0	25,805	.3
1959	783,789	8.8	5,132,194	57.5	1,298,487	14.6	11,086	.1

Year	Butane-propane mixtures	Percent of total	All other mixtures	Percent of total	Total LP-gas and ethane	Total percent
1955	1,428,938	23.3	708,875	11.6	6,122,718	100.0
1956	1,160,017	17.5	924,924	14.0	6,635,763	100.0
1957	934,183	13.5	851,325	12.2	6,939,121	100.0
1958	1,050,086	14.1	1,019,281	13.7	7,462,089	100.0
1959	1,143,284	12.8	550,321	6.2	8,919,161	100.0

[1] Data include LR-gases but exclude LP-gases blended into gasoline.
[2] Not reported separately before 1959.
[3] Not reported separately before 1956.

TABLE 12.—Sales of LP-Gases[1] and ethane in the United States, 1955–59, by use, in thousand gallons

Year	Domestic and commercial	Internal combustion	Industrial	Refinery fuel	Gas manufacturing	Chemical	Synthetic rubber	Used in the secondary recovery of petroleum	All other	Total
1955	2,801,379	651,821	423,431	101,033	213,760	1,493,177	406,210	(2)	31,907	6,122,718
1956	3,001,021	773,471	438,916	142,590	212,293	1,600,604	418,101	(3)	48,767	6,635,763
1957	3,067,070	805,056	441,474	122,405	231,155	1,732,338	418,189	68,557	52,877	6,939,121
1958	3,293,677	852,387	492,862	179,231	238,911	1,898,862	371,961	68,981	65,217	7,462,089
1959	3,934,792	889,698	439,200	136,830	182,903	2,525,910	513,941	231,134	64,753	8,919,161

[1] Data include LR-gases but exclude LP-gases blended into gasoline.
[2] Not reported separately before 1957.

Digitized by Google

TABLE 13.—Sales of LP-gases[1] and ethane in the United States, 1958–59, by districts, States, and use, in thousand gallons—Continued

District[2] and State	Domestic and commercial		Internal combustion		Industrial		Refinery fuel		Gas manufacturing	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
District 1:										
Connecticut	26,245	32,822	357	1,013	10,690	8,679			378	1,161
Delaware	10,574	10,031	159	186	1,483	1,908			2,161	98
Florida	130,968	155,499	13,205	12,733	8,968	8,868			41,748	20,116
Georgia	60,893	99,953	3,750	11,778	11,066	7,376			31,182	16,781
Maine	19,100	16,484	340	133	1,005	792			611	483
Maryland and District of Columbia	29,327	29,092	381	1,005	2,971	3,220			6,977	4,771
Massachusetts	35,725	37,845	475	842	3,595	3,117			2,620	3,965
New Hampshire	13,595	18,243	244	15	577	718	(3)	(3)	2,149	1,987
New Jersey	37,766	35,642	2,022	2,201	17,694	17,162			2,592	2,413
New York	91,087	101,857	3,489	3,096	11,965	10,823			2,979	1,431
North Carolina	57,320	69,735	2,287	1,894	7,588	8,819			9,745	6,985
Pennsylvania	54,080	54,342	2,756	2,649	30,542	19,497			6,586	3,265
Rhode Island	6,674	7,169	307	223	555	867			302	453
South Carolina	41,820	42,903	1,402	2,088	7,736	8,924			6,783	153
Vermont	9,054	11,939	93	30	1,220	1,056			2,451	2,936
Virginia	33,038	32,870	1,319	1,360	2,449	3,588			699	1,705
West Virginia	6,733	9,134	340	272	504	1,722			130	256
Total	663,999	765,560	32,956	41,518	120,608	107,136	43,774	26,944	120,093	68,959
District 2:										
Illinois	217,448	238,201	50,258	45,153	40,691	37,241			19,535	13,387
Indiana	123,051	158,674	10,081	6,711	18,512	44,974			19,296	20,284
Iowa	85,206	123,185	4,158	3,584	7,198	6,669			4,742	2,314
Kansas	127,291	167,157	31,174	38,949	7,527	6,359			404	-------
Kentucky	52,933	58,238	3,626	2,408	3,527	2,679			205	-------
Michigan	72,142	88,530	3,256	1,538	14,516	8,865			2,318	1,342
Minnesota	116,305	142,952	7,314	6,651	20,737	23,094			8,033	9,177
Missouri	171,325	209,597	12,580	10,789	9,994	10,941	(3)	(3)	4,072	2,826
Nebraska	63,822	80,915	12,298	16,310	2,924	1,544			818	354
North Dakota	26,150	33,965	6,008	8,197	1,535	1,869			1,659	2,394
Ohio	73,412	80,182	6,076	4,627	11,039	10,551			2,714	10,900
Oklahoma	189,049	205,351	64,679	60,320	14,154	14,751			933	323
South Dakota	34,880	49,680	5,176	4,835	2,297	1,036			2,367	267
Tennessee	32,025	39,770	5,159	4,421	5,523	3,147			1,556	1,168
Wisconsin	80,113	112,351	5,654	5,457	32,391	42,232			8,023	8,979
Total	1,465,152	1,788,748	227,497	219,950	192,565	215,952	73,878	43,359	76,665	73,715
District 3:										
Alabama	90,350	87,760	7,420	6,332	2,976	2,877			5,381	973
Arkansas	112,037	120,024	38,646	51,783	9,046	2,337			10	-------
Louisiana	48,612	70,190	17,119	31,811	14,933	14,646	(3)	(3)	-------	1,383
Mississippi	73,001	91,270	21,905	31,312	4,413	3,991			107	21
New Mexico	53,411	66,034	30,961	20,817	7,163	6,255			1,758	4,783
Texas	429,201	481,180	378,786	387,024	109,757	32,341			3,850	1,155
Total	806,612	916,458	494,837	529,079	148,288	62,447	23,898	22,735	11,106	8,815
District 4:										
Colorado	75,506	112,462	14,859	14,743	3,968	3,534			456	450
Idaho	8,233	18,312	472	1,236	1,408	2,165			-------	-------
Montana	10,152	26,966	1,802	6,668	465	443	(3)	(3)	-------	-------
Utah	8,513	12,276	2,435	3,042	841	233			-------	-------
Wyoming	18,225	26,055	9,415	16,483	1,395	2,812			-------	-------
Total	120,629	196,071	28,983	42,172	8,077	9,187	8,988	16,714	456	450
District 5:										
Alaska	(4)	1,405	(4)	-------	(4)	-------			(4)	-------
Arizona	21,792	16,993	10,255	5,761	2,883	2,928			93	95
California	157,281	187,827	56,032	47,609	14,035	17,553			6,329	6,197
Nevada	7,589	13,087	134	529	467	192	(3)	(3)	14,700	15,536
Oregon	32,215	29,263	1,240	2,429	3,046	8,692			8,883	8,391
Washington	18,408	19,380	453	651	2,893	15,113			586	745
Total	237,285	267,955	68,114	56,979	23,324	44,478	28,693	27,078	30,591	30,964
Total U.S. sales	3,293,677	3,934,792	852,387	889,698	492,862	439,200	179,231	136,830	238,911	182,903

See footnotes at end of table.

Digitized by Google

TABLE 13.—Sales of LP-gases[1] and ethane in the United States, 1958–59, by districts, States and use, in thousand gallons—Continued

District[2] and State	Chemical		Synthetic rubber		Used in the secondary recovery of petroleum		All other		Total	
	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959
District 1:										
Connecticut	-------	-------					1,575	2,303	39,245	45,978
Delaware	48	-------					272	30	14,697	12,253
Florida	3	-------					3,754	2,756	198,646	199,972
Georgia	214	179					2,001	2,829	109,106	138,896
Maine	-------	-------					94	57	21,150	17,949
Maryland and D.C.	-------	-------					5	5	39,661	38,093
Massachusetts	298	-------					771	828	43,484	46,597
New Hampshire	-------	-------	(3)	(3)	(3)	(3)	-------	-------	16,565	20,963
New Jersey	40,954	61,949					54	34	101,082	119,401
New York	162	284					434	31	110,116	117,522
North Carolina	94	-------					5,005	4,554	82,039	91,987
Pennsylvania	13,526	15,894					51	80	107,541	95,727
Rhode Island	-------	-------					10	-------	7,848	8,712
South Carolina	69	-------					790	934	58,600	55,002
Vermont	-------	-------					-------	-------	12,818	15,961
Virginia	-------	144					660	561	38,195	40,228
West Virginia	207,789	302,443					180	-------	215,676	313,827
Total	263,157	380,893	-------	-------	-------	-------	15,656	15,002	1,260,243	1,406,012
District 2:										
Illinois	129,753	156,745					1,828	1,241	459,513	491,968
Indiana	17,425	174					427	321	188,782	231,138
Iowa	-------	-------					1,375	2,428	102,679	138,180
Kansas	13	-------					1,826	1,250	168,235	213,715
Kentucky	67,407	64,272					232	263	127,930	127,860
Michigan	2,754	3,357					851	1,115	95,837	104,747
Minnesota	812	3,195					1,062	1,415	154,263	186,484
Missouri	-------	-------	(3)	(3)	(3)	(3)	326	269	198,297	234,422
Nebraska	-------	-------					2,027	1,023	81,889	100,146
North Dakota	-------	-------					-------	39	35,352	46,464
Ohio	573	661					426	409	94,240	107,330
Oklahoma	8,833	1,653					1,973	1,323	279,621	283,721
South Dakota	-------	-------					190	138	44,910	55,956
Tennessee	10	132					360	186	44,633	48,824
Wisconsin	75	-------					424	487	126,080	169,506
Total	227,655	230,189	-------	-------	9,958	20,331	13,327	11,907	[6] 2,286,697	[6] 2,604,151
District 3:										
Alabama	-------	-------					537	994	106,664	98,936
Arkansas	-------	-------					1,759	1,366	161,498	175,510
Louisiana	189,454	363,188	37,124	45,591	(3)	(3)	653	3,206	307,895	530,515
Mississippi	577	-------	-------	-------			968	503	100,971	127,097
New Mexico	-------	-------	-------	-------			2,722	534	96,015	98,423
Texas	1,121,062	1,461,231	317,902	441,405			15,302	19,180	2,375,860	2,823,516
Total	1,311,093	1,824,419	355,026	486,996	50,718	191,460	21,941	25,783	[6] 3,223,519	[6] 4,068,192
District 4:										
Colorado	7	-------					1,080	1,557	95,876	132,746
Idaho	-------	-------					295	44	10,408	21,757
Montana	-------	-------	(3)	(3)	(3)	(3)	20	-------	12,439	34,077
Utah	-------	177					211	3	12,000	15,731
Wyoming	-------	-------					189	57	29,224	45,407
Total	7	177	-------	-------	1,265	1,307	1,795	1,661	[6] 170,200	[6] 267,739
District 5:										
Alaska	(4)	-------	(4)	-------	(4)	-------	(4)	-------	(4)	1,405
Arizona	-------	-------	-------	-------			754	-------	35,777	25,777
California	96,950	90,232	16,935	26,945	(3)	(3)	7,829	10,103	355,391	386,466
Nevada	-------	-------	-------	-------			2	-------	22,892	29,344
Oregon	-------	-------	-------	-------			3,358	131	48,742	48,906
Washington	-------	-------	-------	-------			555	166	22,895	36,055
Total	96,950	90,232	16,935	26,945	7,040	18,036	12,498	10,400	[6] 521,430	[6] 573,067
Total U.S. sales	1,898,862	2,525,910	371,961	513,941	68,981	231,134	65,217	64,753	7,462,089	8,919,161

[1] Data include LR-gases, but exclude LP-gases blended into gasoline.
[2] States are grouped according to petroleum-marketing districts rather than geographic areas.
[3] Individual States not shown to avoid disclosure of individual company data.
[4] Not included in United States totals before 1959.
[5] No sales for synthetic rubber reported in this district.
[6] Refinery fuel and use for secondary recovery included in district totals only.

569112—60——22

Digitized by Google

TABLE 14.—Sales of LP-gases [1] and ethane in the United States, by districts and States, 1958–59, in thousand gallons

District [2] and State	Total LP-gases and ethane													Percent change
	Ethane [3]	Propane		Butane		Isobutane		Butane-propane mixtures		All other mixtures		Total LP-gases and ethane		
	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	1958	1959	
District 1:														
Connecticut		38,494	45,135	719	825			32	18			39,245	45,978	17.2
Delaware		14,603	12,182		1			94	70			14,697	12,253	−16.6
Florida		143,235	153,211	13,195	3,344			42,216	43,417			198,646	199,972	0.7
Georgia		93,484	98,832	4,686	4,890			10,936	35,174			109,106	138,896	27.3
Maine		21,147	17,949	2				1				21,150	17,949	−15.1
Maryland & D.C.		39,447	37,874					214	219			39,661	38,093	−4.0
Massachusetts		43,231	46,205	133	392			120				43,484	46,597	7.2
New Hampshire		15,188	19,666	1,356	1,287			21	10			16,565	20,963	26.5
New Jersey	27,740	64,336	67,228	19,694	24,024	21		268	310	16,763	99	101,082	119,401	18.1
New York		105,933	113,385	151	12			4,032	4,125			110,116	117,522	6.7
North Carolina		78,767	89,144	345	239			2,927	2,604			82,039	91,987	12.1
Pennsylvania		97,706	90,494	1,566	1,545			8,269	3,688			107,541	95,727	−11.0
Rhode Island		7,848	8,712									7,848	8,712	11.0
South Carolina		46,633	43,031	286	89			11,681	11,882			58,600	55,002	−6.1
Vermont		12,609	15,961					209				12,818	15,961	24.5
Virginia		37,961	40,021	234	207							38,195	40,228	5.3
West Virginia	184,865	6,716	10,228	16,284	17,478			225	2,747	192,451	98,509	215,676	313,827	45.5
Total	212,605	[4] 885,598	[4] 917,680	[4] 84,165	[4] 70,468	21		81,245	106,239	209,214	[4] 99,020	[4] 1,260,243	[4] 1,406,012	11.6
District 2:														
Illinois	154,846	306,090	326,418	20,176	5,885			4,652	4,819	128,595		459,513	491,968	7.1
Indiana		178,332	189,980	8,432	37,975			2,018	3,183			188,782	231,138	22.4
Iowa		100,653	136,396	1,303	1,186			723	598			102,679	138,180	34.6
Kansas		131,027	171,577	14,665	21,701			22,543	20,437			168,235	213,715	27.0
Kentucky	63,987	55,319	60,899	3,922	114			2,851	2,860	65,838		127,930	127,860	−0.1
Michigan		91,560	100,600	1,442	332			81	1,941	2,754	1,874	95,837	104,747	9.3
Minnesota		142,689	174,712	10,392	11,747			1,182	25			154,263	186,484	20.9
Missouri		184,363	216,843	3,696	4,547			10,238	13,032			198,297	234,422	18.2
Nebraska		75,968	95,220	3,710	2,595			2,211	2,331			81,889	100,146	22.3
North Dakota		29,700	41,338	3,703	3,160			1,949	1,966			35,352	46,464	31.4
Ohio		86,443	106,810	2,557	343			5,240	177			94,240	107,330	13.9
Oklahoma		160,774	186,276	48,210	30,360	8,690	196	61,947	66,889			279,621	283,721	1.5
South Dakota		42,513	54,335	1,586	468			811	1,153			44,910	55,956	24.6
Tennessee		38,212	42,228	1,577	1,757			4,844	4,839			44,633	48,824	9.4
Wisconsin		104,581	145,138	17,129	22,082			4,970	2,286			126,680	169,506	33.8
Total	218,833	[5] 1,741,466	[5] 2,072,650	[5] 204,316	[5] 175,203	8,690	196	[4] 135,038	[4] 135,395	197,187	1,874	[5] 2,286,697	[5] 2,604,151	13.9

Digitized by Google

District 3:														
Alabama		57,053	61,395	3,637	5,214			45,974	32,327			106,664	98,936	−7.3
Arkansas		77,287	94,014	11,012	12,855			73,199	68,641			161,498	175,510	8.7
Louisiana	196,416	71,131	62,241	34,247	58,954	10,620		46,677	70,381	145,220	142,523	307,895	530,515	72.3
Mississippi		44,675	57,067	10,518	11,737			45,778	58,293			100,971	127,097	25.9
New Mexico		54,914	74,411	19,920	2,209			21,181	21,803			96,015	98,423	2.5
Texas	155,935	738,731	1,104,029	687,139	741,721	6,474	10,890	503,820	543,491	439,696	267,450	2,375,860	2,823,516	18.8
Total	352,351	[1] 1,108,082	[1] 1,504,648	[1] 774,078	[1] 995,394	17,094	10,890	[1] 739,349	[1] 794,936	584,916	409,973	[1] 3,323,519	[1] 4,068,192	26.2
District 4:														
Colorado		87,139	122,343	3,516	1,974			5,221	8,429			95,876	132,746	38.5
Idaho		10,400	21,757	4				4				10,408	21,757	109.0
Montana		10,132	29,803	1,006	1,681			1,301	2,593			12,439	34,077	174.0
Utah		9,885	13,744	678	977			1,437	1,010			12,000	15,731	31.1
Wyoming		17,163	32,370	2,911	1,470			9,150	11,567			29,224	45,407	55.4
Total		[1] 135,647	[1] 225,520	[1] 17,440	[1] 18,620			17,113	23,599			[1] 170,200	[1] 267,739	57.3
District 5:														
Alaska		(6)	1,405	(6)		(6)		(6)		(6)		(6)	1,405	
Arizona		29,637	21,268		95			6,140	4,414			35,777	25,777	−28.0
California		221,123	237,848	36,080	37,752			70,224	71,412	27,964	39,454	355,391	386,466	8.7
Nevada		22,744	29,326					148	18			22,892	29,344	28.2
Oregon		48,180	45,624					562	3,282			48,742	48,906	0.3
Washington		22,628	32,066					267	3,989			22,895	36,055	57.5
Total		[1] 376,580	[1] 411,696	[1] 39,545	[1] 38,802			77,341	83,115	27,964	39,454	[1] 521,430	[1] 573,067	9.9
Total U.S. sales	783,789	4,247,373	5,132,194	1,119,544	1,298,487	25,805	11,086	1,050,086	1,143,284	1,019,281	550,321	7,462,089	8,919,161	19.5

[1] Data include LR-gases, exclude LP-gases blended into gasoline.
[2] States are grouped according to petroleum marketing districts rather than geographic areas.
[3] Not reported separately before 1959.
[4] Consumption as refinery fuel shown in district totals only.
[5] Refinery fuel and use of secondary recovery includes district totals only.
[6] Not included in U.S. totals before 1959.

Digitized by Google

STOCKS

Stocks of natural gas liquids at plants and terminals on December 31, 1959, were 968 million gallons, 196 million gallons more than on December 31, 1958. Underground stocks of LP-gases totaled 639 million gallons at the end of 1959, compared with 515 million gallons at the end of 1958. Stocks of natural gas liquids at refineries at the end of 1959 totaled 78 million gallons.

TABLE 15.—Stocks of natural gas liquids in the United States, 1955–58 and 1959, by months, in thousand gallons

Date	Natural gasoline		LP-gases		Other products		Total		
	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	At plants and terminals	At refineries	Grand total
Dec. 31:									
1955	92,047	73,752	281,649	18,480	96,299	7,476	469,995	99,708	569,703
1956	136,335	58,422	560,928	26,166	72,345	9,282	769,608	93,870	863,478
1957	121,414	46,830	605,249	22,596	94,481	15,246	821,144	84,672	905,816
1957 [1]	121,414	46,830	[1] 546,005	22,596	94,481	15,246	[1] 761,900	84,672	[1] 846,672
1958	156,788	41,496	634,885	29,820	80,289	12,306	871,962	83,622	955,584
1959									
Jan. 31	155,080	48,342	424,635	29,946	88,195	10,122	667,910	88,410	756,320
Feb. 28	167,826	47,880	386,655	33,222	95,500	10,248	649,981	91,350	741,331
Mar. 31	172,568	53,298	471,595	31,668	83,711	7,182	727,874	92,148	820,022
Apr. 30	169,108	48,384	620,563	[2] 18,186	80,602	11,886	870,273	78,456	948,729
May 31	179,521	48,804	807,524	17,472	80,362	9,156	1,067,407	75,432	1,142,839
June 30	186,406	43,386	920,999	18,690	78,725	10,794	1,186,130	72,870	1,259,000
July 31	162,606	45,360	1,008,677	18,312	71,036	8,442	1,242,319	72,114	1,314,433
Aug. 31	141,548	38,220	1,054,111	17,976	72,780	11,802	1,268,439	67,998	1,336,437
Sept. 30	135,246	39,522	1,097,410	19,740	69,100	14,868	1,301,756	74,130	1,375,886
Oct. 31	137,694	33,978	1,062,374	20,958	70,765	15,792	1,270,833	70,728	1,341,561
Nov. 30	133,136	38,136	942,852	26,040	72,697	10,794	1,148,685	74,970	1,223,655
Dec. 31	128,100	41,958	767,143	23,436	72,426	12,180	967,669	77,574	1,045,243

[1] New basis: To eliminate nonrecoverable stock of LP-gas in underground storage.
[2] Decrease from last month's stock figure due mainly to the exclusion of underground stocks of LP-gas at refineries. Such stocks are now included in the figures for stocks at plants and terminals.

Digitized by Google

PRICES

In 1959, the average price of natural gasoline to blenders, grade 26–70, f.o.b. group 3 basis, was 4.5 cents per gallon, unchanged from 1958. The average value received by producers for all grades of natural gasoline was 6.9 cents per gallon.

The average posted price of propane f.o.b. New York Harbor on December 31, 1959, was 9.17 cents per gallon, a decline of 1 cent from the posted price at the end of 1958. The average price at Baton Rouge at the end of 1959 was 5.75 cents per gallon or 0.25 cent less than the price at the end of 1958. Producers received an average of 4.4 cents per gallon for LP-gases, compared to 4.37 cents in 1958.

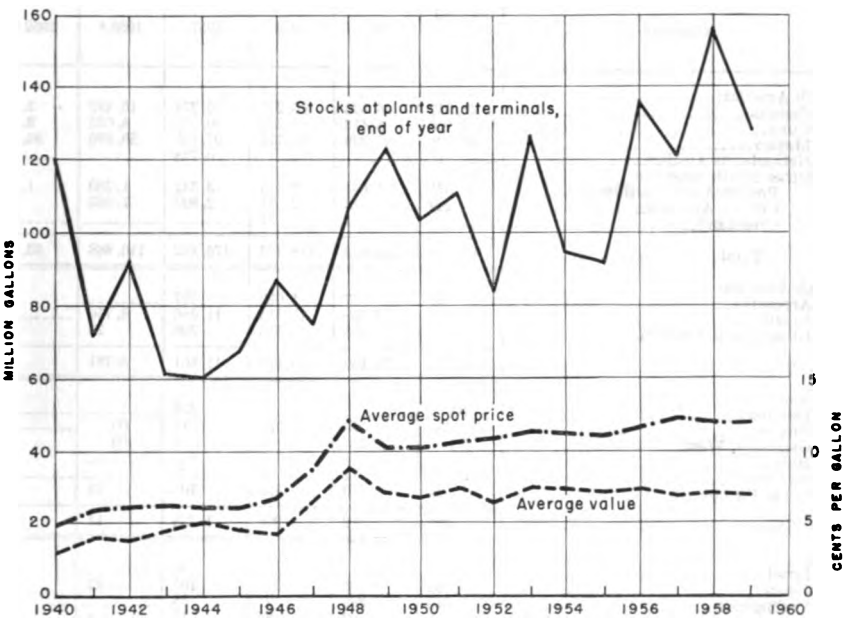

FIGURE 2.—Average value of natural gasoline, average spot price of U.S. Motor Fuel (Oklahoma), and stocks of natural gasoline, 1940–59.

Digitized by Google

FOREIGN TRADE [6]

Exports of LP-gases were 95 million gallons in 1959, a decline of 21 percent from exports in 1958. The decrease is due primarily to curtailed shipments to Mexico and Canada. Mexico received 89 percent of the LP-gas shipments in 1959. Natural gasoline exports from the United States were small. Only 91,000 gallons was shipped in 1959, a decline of 39 percent from 1958.

TABLE 16.—LP gases [1] exported from the United States, 1950–54 (average) and 1955–59, by countries, in thousand gallons [2]

[Bureau of the Census]

Country	1950–54 (average)	1955	1956	1957	1958 [3]	1959 [3]
North America:						
Canada	46,952	56,826	55,275	56,274	15,497	3,768
Cuba	3,506	6,416	8,382	10,158	4,032	3,727
Mexico	43,991	95,398	88,779	97,161	88,996	84,965
Netherlands Antilles				6,728		
Other North America:						
Bermuda and Caribbean	861	1,645	3,015	3,332	1,280	1,118
Central America	249	1,558	2,981	2,809	1,063	278
Greenland			31			
Total	95,559	161,843	158,463	176,462	110,868	93,856
South America:						
Argentina	11	7	1,033	107		72
Brazil	11,854	13,668	18,554	11,386	8,756	
Other South America	39	485	348	368	25	95
Total	11,904	14,160	19,935	11,861	8,781	167
Europe:						
Denmark	(4)			638		
France	385	93	31	41	(4)	
Germany, West	(4)	333	6	4	(4)	132
Italy	(4)	24	125	845		15
Sweden	(4)	12	12	125		
Other Europe	14	110	121	105	11	5
Total	399	572	295	1,758	11	152
Asia:						
Israel	17	(4)	37	36		50
Japan	102	461	313	195	12	164
Philippines	515	399	21	38		
Other Asia	9	2	67	15	4	
Total	643	862	438	284	16	214
Africa	112	149	307	129	10	
Oceania	55	122	68	109	183	140
Grand total	108,672	177,708	179,506	190,603	119,869	94,529

[1] Data include LR-gases.
[2] 4.5 pounds = 1 gallon.
[3] Owing to changes in classification, data not strictly comparable with earlier years.
[4] Less than 500 gallons.

[6] Figures on exports compiled by Mae B. Price and Elsie D. Jackson, Bureau of Mines, from records of the U.S. Department of Commerce.

Digitized by Google

TABLE 17.—Natural gasoline exported from the United States, 1950–54 (average) and 1955–59, by countries, in thousand gallons

[Bureau of the Census]

Country	1950–54 (average)	1955	1956	1957	1958	1959
Canada	30,241	5,447	8,362	1,821	133	67
Mexico	9	----	14	81	8	24
Netherlands Antilles	7,561	----	----	----	----	----
Other countries	11,125	----	----	----	7	----
Total	48,936	5,447	8,376	1,902	148	91

Digitized by Google

Digitized by Google

Crude Petroleum and Petroleum Products

By James G. Kirby,[1] Walter G. Messner,[2] and Betty M. Moore[3]

Contents

	Page
General summary	337
Demand by products	338
Scope of report	345
Districts	346
World oil supply	347
Reserves	347
Crude petroleum	348
Supply and demand	348
Production	352
General	352
By States	352
Wells	366
Consumption and distribution	372
Stocks	382
Value and price	387
Refined products	388
General review	388
Refined products—Continued	
Refinery capacity	401
Aviation gasoline	401
Gasoline	404
Kerosine	419
Distillate fuel oil	423
Residual fuel oil	428
Lubricants	432
Jet fuels	435
Liquefied gases	437
Asphalt and roal oil	437
Other products	445
Intercoastal shipments	448
Foreign trade	450
World supply and demand	460
Petroleum	460
Oil shale	468
Native asphalt	468

GENERAL SUMMARY

THE TOTAL demand[4] for petroleum and petroleum products increased 3.2 percent in 1959 and averaged 9,662,000 barrels daily. Exports declined 7.6 percent, exclusive of the decline caused by inclusion of Alaska as a part of the United States in 1959.

[1] Chief, Section of Economic Analysis and Forecast.
[2] Business analyst.
[3] Statistical assistant.
[4] Certain terms, as used in this chapter, are more or less unique to the petroleum industry. Principal terms, and their meanings, are:
Total demand.—A derived figure representing total new supply plus decreases or minus increases in reported stocks. Because there are substantial secondary and consumers' stocks that are not reported to the Bureau of Mines, this figure varies considerably from consumption.
Domestic demand.—Total demand less exports.
New supply of all oils.—The sum of crude-oil production plus production of natural-gas liquids, plus benzol (coke oven) used for motor fuel plus imports of crude oil and other petroleum products.
Transfers.—Crude oil conveyed to fuel-oil stocks without processing, or reclassification of products from one product category to another.
All oils.—Crude petroleum, natural-gas liquids, and their derivatives.
Principal products.—Gasoline, kerosine, distillate fuel oil, and residual fuel oil.
Exports.—Total shipments from the United States, including shipments to U.S. Territories and possessions.
Barrels.—42 gallons per barrel.

Digitized by Google

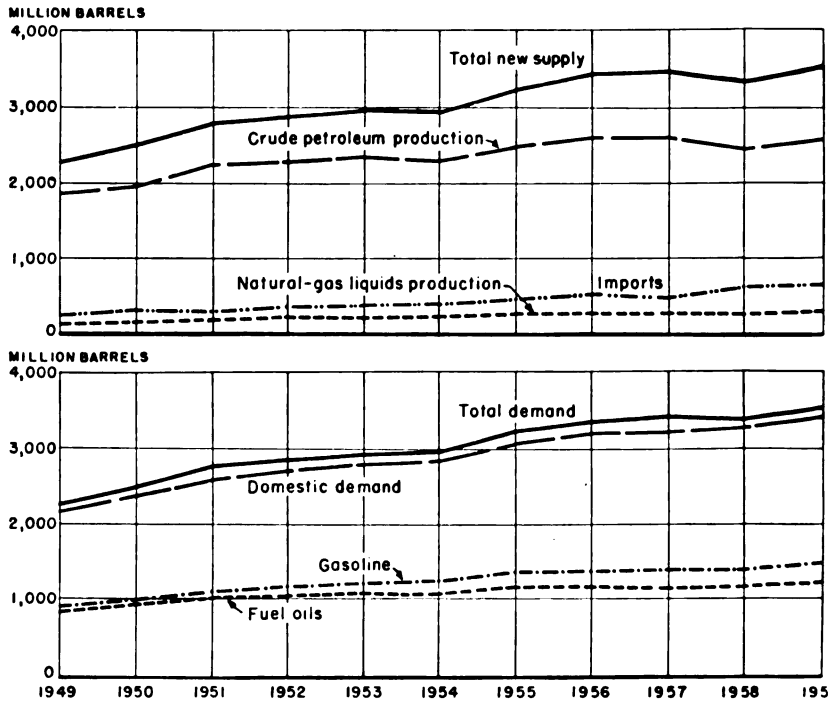

FIGURE 1.—Supply and demand of all oils in the United States, 1949–59.

Domestic demand was 3.6 percent higher in 1959. Indications in the first half of the year were for a much higher gain, but the steel strike and warm weather in the last quarter curbed the rate of gain for the year.

In April, a mandatory oil-import program which applied to all petroleum imports replaced the Voluntary Oil Import Control Program. In the first quarter of 1959, imports of all oils were 31.6 percent above the same period of 1958, but for the balance of the year, imports were 4 percent below the corresponding period of 1958.

The total new supply of all oils in the United States was 3,545 million barrels in 1959. Crude-oil production represented 72.6 percent, natural-gas liquids 9.1 percent, and imports 18.3 percent of the total new supply.

DEMAND BY PRODUCTS

As most of the indicated consumption of crude oil in the United States is converted into products at refineries before sale to ultimate consumers, the analysis of demand trends involves consideration of each major product. The fuel oils (residual, distillate, and kerosine) compete directly with natural gas or coal in heating, cooking, and industrial uses. Gasoline and diesel fuel are the major fuels in the transportation field. The other products serve a wide variety of uses in competition with other oil products as fuel and in special uses out-

Digitized by Google

TABLE 1.—Salient statistics of crude petroleum, refined products, and natural-gas liquids in the United States, 1955–59 [1]

	1955	1956	1957	1958	1959 [2]
Crude petroleum:					
Domestic production thousand barrels [3]	2,484,428	2,617,283	2,616,901	[4] 2,449,016	[4] 2,574,590
World production do	5,625,659	6,124,565	6,436,085	6,607,856	7,127,310
United States proportion percent	44	43	41	37	36
Imports [5] thousand barrels [3]	285,421	341,833	373,255	348,007	352,344
Exports [6] do	11,571	28,624	50,243	4,346	2,526
Stocks, end of year do	265,610	266,014	281,813	[4] 262,742	[4] 257,129
Runs to stills do	2,730,218	2,905,106	2,890,436	2,789,404	2,917,661
Value of domestic production at wells:					
Total thousand dollars	6,870,380	7,296,760	8,079,259	[4] 7,380,065	[4] 7,476,369
Average per barrel	$2.77	$2.79	$3.09	[4] $3.01	[4] $2.90
Total producing oil wells December 31	524,010	551,170	569,273	574,905	[4] 583,141
Total oil wells completed during year (successful wells)	31,567	31,158	28,164	25,262	[4] 26,634
Refined products:					
Imports [5] thousand barrels [3]	170,143	183,758	201,334	272,582	297,285
Exports [6] do	122,617	128,762	156,944	96,292	84,957
Stocks, end of year do	435,685	493,818	537,937	[7] 504,044	526,026
Output of gasoline do	1,373,950	1,428,807	1,438,140	1,439,511	1,488,058
Yield of gasoline percent	44.0	43.4	43.8	45.2	44.9
Average dealers' net price (excluding tax) of gasoline in 55 United States cities cents per gallon [8]	16.18	16.34	16.69	16.22	16.09
Completed refineries, end of year	318	319	318	313	311
Daily crude-oil capacity thousand barrels [3]	8,632	9,124	9,408	9,820	9,901
Natural gas liquids:					
Production thousand barrels [3]	281,371	292,727	294,990	294,749	320,534
Stocks, end of year do	13,564	20,559	20,156	22,752	24,887

[1] Data, including imports and exports, are for the United States.
[2] Preliminary figures.
[3] 42 gallons per barrel.
[4] Includes Alaska.
[5] Bureau of Mines data.
[6] U.S. Department of Commerce, except Alaska (before 1959) and Hawaii, which are Bureau of Mines data. Exports include shipments to Territories.
[7] New basis, comparable to 1959 which includes stocks located at bulk terminals in Alaska: gasoline, 244,000 barrels; kerosine, 9,000 barrels; distillate fuel oil, 407,000 barrels; residual fuel oil, 52,000 barrels; jet fuel oil, 16,000 barrels; and lubricants, 2,000 barrels.
[8] Platt's Oilgram Price Service.

side the fuels field. The use of jet fuel (a blend of low-grade gasoline, kerosine, and distillate) has advanced rapidly in the last few years. It has been limited mostly to military use, as commercial jet planes use straight kerosine as fuel.

Gasoline.—Total demand for gasoline in 1959 increased 2.6 percent to 1,500.7 million barrels. This represents 42.6 percent of the total demand for all oils. Domestic demand increased 2.9 percent, whereas exports declined 16.7 percent. A breakdown of domestic demand by uses indicates that civilian highway use accounted for 87.1 percent and aviation gasoline for 5.2 percent, leaving a balance of 7.7 percent for nonhighway vehicles, military vehicles, stationary engines, nonfuel use, and losses. The total demand for gasoline includes aviation gasoline and naphthas.

Residual Fuel Oil.—The total demand for residual fuel oil reversed the trend of the preceding 2 years and increased 5 percent in 1959. Domestic demand increased 5.1 percent and exports 3.5 percent. Residual fuel, used for bunkering vessels engaged in foreign trade or by railroads, declined slightly, but electric-power plants used 10.6 million barrels more residual fuel oil in 1959 than in 1958.

Digitized by Google

TABLE 2.—Supply and demand of all oils[1] in the United States, 1957 total and 1958–59, by months

(Thousand barrels)

	1958												1957 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	213,280	190,947	194,580	189,014	193,205	190,172	203,701	215,030	212,642	215,887	209,252	221,277	2,448,987	2,616,901
Natural-gas liquids	25,615	23,044	25,030	23,410	23,491	22,599	24,210	24,886	24,326	25,415	25,583	27,140	294,749	294,990
Benzol, etc.	15	24	22	30	26	60	43	45	34	35	47	35	416	252
Total production	238,910	214,015	219,632	212,454	216,722	212,831	227,954	239,961	237,002	241,337	234,882	248,452	2,744,152	2,912,143
Imports:														
Crude petroleum[2]	31,747	23,232	31,366	25,835	28,972	28,802	26,916	29,865	29,927	28,885	29,026	33,434	348,007	373,255
Refined products[3]	24,891	21,406	19,096	23,145	18,047	20,340	23,098	18,663	20,020	25,748	24,050	34,078	272,582	201,334
Total new supply	295,548	258,653	270,094	261,434	263,741	261,973	277,968	288,489	286,949	295,970	287,958	315,964	3,364,741	3,486,732
Increase (+) or decrease (−) in stocks	−25,019	−37,066	−11,748	−5,341	+5,679	+7,058	+2,510	+18,554	+22,135	+6,173	+8,464	−42,509	−51,110	+60,926
Demand:														
Total demand	320,567	295,719	281,842	266,775	258,062	254,915	275,458	269,935	264,814	289,797	279,494	358,473	3,415,851	3,425,806
Exports:[3]														
Crude petroleum	425	213	838	643	503	216	308	334	170	330	292	74	4,346	50,243
Refined products	7,215	7,396	7,681	7,301	8,219	7,285	9,513	9,041	8,591	8,439	8,827	6,784	96,292	156,944
Domestic demand:														
Gasoline	109,077	97,211	110,366	120,466	126,661	127,111	132,378	131,290	121,530	126,256	112,086	121,465	1,435,897	1,392,953
Kerosine	17,433	16,539	11,015	6,087	4,374	4,276	5,534	5,267	6,027	9,005	10,109	17,613	113,279	107,701
Distillate fuel oil	83,746	81,969	62,570	46,315	37,384	32,184	36,922	31,973	38,186	47,444	57,115	97,618	653,426	616,090
Residual fuel oil	56,446	50,447	46,206	41,549	35,870	33,997	38,095	39,114	36,831	45,015	44,591	62,906	531,067	548,801
Jet fuel	6,484	6,852	7,598	8,835	6,778	8,062	8,275	7,127	9,276	9,675	7,099	8,116	94,177	72,961
Lubricants	2,951	2,754	3,179	3,007	3,230	3,706	3,298	3,525	3,362	3,524	3,497	3,439	39,472	41,215
Miscellaneous	36,790	32,338	32,389	32,572	35,043	38,078	41,135	42,264	40,841	40,109	35,878	40,458	447,895	438,898
Total domestic demand	312,927	288,110	273,323	258,831	249,340	247,414	265,637	260,560	256,053	281,028	270,375	351,615	3,315,213	3,218,619
Stocks:														
Crude petroleum	284,539	285,048	278,534	273,959	263,105	253,550	246,556	244,810	251,701	255,345	257,546	262,730	262,730	81,813
Natural-gas liquids	16,996	13,829	13,967	15,582	19,341	22,445	24,210	26,182	27,437	27,894	27,349	22,752	22,752	[4] 20,156
Refined products	513,352	478,944	473,572	471,191	483,965	497,474	505,213	523,541	537,530	539,602	546,410	503,314	503,314	537,937
Total stocks	814,887	777,821	766,073	760,732	766,411	773,469	775,979	794,533	816,668	822,841	831,305	788,796	788,796	[4] 839,906

Digitized by Google

	1959 [1] [6]												1958 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	223,000	201,420	222,836	217,685	223,802	212,473	210,290	209,715	205,683	214,226	209,428	222,945	2,574,403	2,448,987
Natural-gas liquids	26,660	25,041	27,281	26,132	26,606	25,934	26,165	26,524	26,012	27,439	27,601	29,139	320,534	294,749
Benzol, etc	37	50	47	30	32	16	25	15	21	17	17	17	324	416
Total production	250,597	226,511	250,164	243,847	250,440	238,423	236,480	236,254	231,716	241,682	237,046	252,101	2,895,261	2,744,152
Imports:														
Crude petroleum [3]	28,684	29,482	28,121	22,271	29,089	36,158	27,534	29,955	29,507	30,377	29,442	31,899	352,519	348,007
Refined products [3]	36,236	36,476	40,636	20,083	16,884	20,919	16,406	16,149	21,659	17,284	25,456	29,083	297,271	272,582
Total new supply	315,517	292,469	318,921	286,201	296,413	295,500	280,420	282,358	282,882	289,343	291,944	313,083	3,545,051	3,364,741
Increase (+) or decrease (−) in stocks	−35,126	−2,630	+7,083	+6,644	+33,486	+17,281	+2,681	+13,320	+205	+13,271	−9,354	−28,600	+18,261	−51,110
Demand:														
Total demand	350,643	295,099	311,838	279,557	262,927	278,219	277,739	269,038	282,677	276,072	301,298	341,683	3,526,790	3,415,851
Exports: [5]														
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526	4,346
Refined products	8,295	6,742	7,743	8,592	7,485	8,098	7,846	7,302	7,160	7,617	5,820	7,714	90,414	96,292
Domestic demand:														
Gasoline	114,617	99,676	118,869	124,700	126,892	133,506	136,887	132,628	130,057	120,769	115,944	123,439	1,477,984	1,435,897
Kerosine	17,995	13,113	10,693	5,980	4,011	4,552	6,058	4,366	7,868	8,056	11,723	15,544	109,959	113,279
Distillate fuel oil	95,044	73,933	67,136	47,414	37,239	36,184	33,885	31,138	42,462	45,889	65,712	80,795	656,831	653,426
Residual fuel oil	62,926	57,394	59,261	45,122	37,705	40,432	35,971	34,644	37,827	38,320	50,065	58,588	558,255	531,067
Jet fuel	8,086	7,196	7,567	8,580	7,474	7,907	8,983	9,233	10,978	9,354	8,754	10,055	104,167	94,177
Lubricants	3,499	2,744	3,797	3,573	3,827	3,895	3,665	3,563	3,733	3,795	3,252	3,331	42,674	39,472
Miscellaneous	39,829	34,204	36,594	35,366	38,027	43,453	44,270	45,927	42,441	42,014	39,896	41,959	483,980	447,895
Total domestic demand	341,996	288,260	303,917	270,735	255,175	269,929	269,719	261,499	275,366	268,197	295,346	333,711	3,433,850	3,315,213
Stocks:														
Crude petroleum	258,102	260,034	254,939	257,564	264,521	272,496	264,988	253,079	250,988	257,479	255,945	257,117	257,117	262,730
Natural-gas liquids	18,008	17,651	19,524	22,589	27,210	29,976	31,296	31,820	32,759	31,942	29,135	24,887	24,887	22,752
Refined products	477,560	473,355	483,660	484,614	506,522	513,062	521,931	546,636	547,993	555,590	550,577	525,053	525,053	503,314
Total stocks	753,670	751,040	758,123	764,767	798,253	815,534	818,215	831,535	831,740	845,011	835,657	807,057	807,057	788,796

See footnotes at end of table.

Digitized by Google

TABLE 2.—Supply and demand of all oils[1] in the United States, 1957 total an d 1958–59, by months—continued
(Thousand barrels)

	1959 [5 7]													1958 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
New supply:														
Domestic production:														
Crude petroleum	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590	
Natural-gas liquids	26,660	25,041	27,281	26,132	26,606	25,934	26,165	26,524	26,012	27,439	27,601	29,139	320,534	
Benzol, etc	37	50	47	30	32	16	25	15	21	17	17	17	324	
Total production	250,623	226,526	250,167	243,847	250,444	238,439	236,501	236,272	231,733	241,704	237,067	252,125	2,895,448	
Imports:														
Crude petroleum [2]	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344	
Refined products [3]	36,237	36,478	40,638	20,084	16,885	20,919	16,407	16,150	21,661	17,284	25,458	29,084	297,285	
Total new supply	315,524	292,471	318,918	286,201	296,418	295,505	280,418	282,365	282,880	289,343	291,946	313,088	3,545,077	
Increase (+) or decrease (−) in stocks	−35,136	−2,628	+7,295	+6,766	+33,433	+17,313	+2,610	+13,291	+185	+13,259	−9,386	−28,486	+18,516	
Demand:														
Total demand	350,660	295,099	311,623	279,435	262,985	278,192	277,808	269,074	282,695	276,084	301,332	341,574	3,526,561	
Exports: [3]														
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526	
Refined products	7,998	6,439	7,297	7,963	7,067	7,600	7,264	6,698	6,653	7,287	5,453	7,238	84,957	
Domestic demand:														
Gasoline	114,720	99,759	118,995	124,917	127,049	133,695	137,141	132,875	130,264	120,858	116,056	123,578	1,479,907	
Kerosine	17,997	13,113	10,693	5,980	4,013	4,552	6,063	4,370	7,871	8,059	11,723	15,545	109,979	
Distillate fuel oil	95,234	74,102	67,218	47,682	37,474	36,438	34,161	31,457	42,694	46,075	65,895	80,976	659,406	
Residual fuel oil	62,940	57,436	59,281	45,130	37,776	40,442	36,068	34,705	37,874	38,370	50,155	58,623	558,800	
Jet fuel	8,086	7,203	7,568	8,589	7,476	7,914	8,983	9,233	10,994	9,364	8,767	10,064	101,241	
Lubricants	3,504	2,746	3,799	3,577	3,831	3,900	3,671	3,567	3,737	3,797	3,255	3,333	42,717	
Miscellaneous	39,829	34,204	36,594	35,367	38,032	43,459	44,283	45,932	42,457	42,016	39,896	41,959	484,028	
Total domestic demand	342,310	288,563	304,148	271,242	255,651	270,400	270,370	262,139	275,891	268,539	295,747	334,078	3,439,078	
Stocks:														
Crude petroleum	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129	257,129	[7] 262,742
Natural-gas liquids	18,008	17,651	19,524	22,589	27,210	29,976	31,296	31,820	32,759	31,942	29,135	24,887	24,887	22,752
Refined products	478,274	474,071	484,593	485,670	507,521	514,088	522,889	547,559	548,900	556,485	551,440	526,026	526,026	[7] 504,044
Total stocks	754,390	751,762	759,057	765,823	799,256	816,569	819,179	832,470	832,655	845,914	836,528	808,042	808,042	[7] 789,538

[1] For definition of this and other terms used in the petroleum industry, see text footnote 4 at the beginning of this chapter.
[2] Bureau of Mines data.
[3] U.S. Department of Commerce, except for exports to Alaska (before 1959 new basis) and Hawaii, which are Bureau of Mines data.
[4] New basis, excludes 1,411,000 barrels of nonrecoverable stocks in underground storage.
[5] Preliminary figures.
[6] Old basis; comparable to 1958, that is, excluding Alaska.
[7] New basis; includes Alaska as part of the United States.

Digitized by Google

TABLE 3.—Demand for all oils[1] in the United States, 1950–59

(Million barrels)

Year	Domestic demand	Exports	Total demand	Year	Domestic demand	Exports	Total demand
1950	2,375.1	111.3	2,486.4	1956	3,213.2	157.4	3,370.6
1951	2,569.8	154.1	2,723.9	1957	3,218.6	207.2	3,425.8
1952	2,664.4	158.2	2,822.6	1958	3,315.2	100.6	3,415.8
1953	2,775.3	146.6	2,921.9	1959 [2 3]	3,433.9	92.9	3,526.8
1954	2,832.4	129.7	2,962.1	1959 [2 4]	3,439.1	87.5	3,526.6
1955	3,087.8	134.2	3,222.0				

[1] See text footnote 4 at beginning of this chapter.
[2] Preliminary figures.
[3] Old basis; comparable to 1958, that is, excluding Alaska.
[4] New basis; includes Alaska as part of the United States.

Production of residual fuel oil continued to decline, and imports supplied 40 percent of the domestic demand in 1959 compared with 34.3 percent in 1958.

Distillate Fuel Oil.—The gain in total demand for distillate fuel oil in 1959 was less than 0.1 percent. Domestic demand increased 0.5 percent for the year, but exports declined 16 percent.

Kerosine.—Part of the 3-percent decline in total demand for kerosine in 1959 possibly is due to the method of reporting. Straight kerosine is used as fuel by commercial airlines for jet and turboprop aircraft. Through 1959 some companies were reporting these sales as kerosine, whereas others included them under jet fuel. The reporting forms for 1960 have been revised so that the data shown for jet fuel will include only military use. All commercial use will be included in data for kerosine.

TABLE 4.—Imports of petroleum products into U.S. Territories and possessions, 1958–59[1]

(Thousand barrels)

	1958			1959[2]					
				Old basis[3]			New basis[4]		
	From the United States	Foreign	Total	From the United States	Foreign	Total	From the United States	Foreign	Total
Gasoline	7,236	63	7,299	7,516	478	7,994	5,427	464	5,891
Kerosine	154	--------	154	127	12	139	99	12	111
Distillate fuel oil	2,703	895	3,598	3,592	13	3,605	735	13	748
Residual fuel oil	5,828	2,512	8,340	5,835	1,327	7,162	5,225	1,327	6,552
Jet fuel	35	474	509	287	254	541	216	254	470
Lubricants:									
Grease	4	--------	4	6	--------	6	6	--------	6
Oil	193	5	198	242	--------	242	198	--------	198
Wax	7	--------	7	3	--------	3	3	--------	3
Asphalt	285	25	310	276	114	390	219	114	333
Unfinished oils	--------	1,632	1,632	--------	3,222	3,222	--------	3,222	3,222
Miscellaneous	12	--------	12	11	--------	11	11	--------	11
Total	16,457	5,606	22,063	17,895	5,420	23,315	12,139	5,406	17,545

[1] Source: U.S. Department of Commerce, except for imports to Alaska and Hawaii from the 48 States, which are Bureau of Mines data.
[2] Preliminary figures.
[3] Comparable to 1958 in which Alaska was included as a Territory
[4] Excludes Alaska, which is now included in the U.S. data.

Digitized by Google

TABLE 5.—Salient statistics for crude petroleum and petroleum products in Alaska, by months, 1959

(Thousand barrels)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Crude petroleum:													
Production	26	15	3	------	4	16	21	18	17	22	21	24	187
Stocks	6	6	1	------	4	9	6	12	8	8	8	12	12
Petroleum products:													
Receipts from West Coast:													
Gasoline	125	96	184	305	97	210	256	249	181	133	97	156	2,089
Kerosine	4	------	3	2	------	1	1	5	3	------	7	2	28
Distillate fuel oil	193	210	237	326	221	293	225	278	297	138	179	260	2,857
Residual fuel oil	16	42	49	3	87	5	87	73	42	56	91	59	610
Jet fuel	------	7	1	7	------	7	3	15	4	7	16	4	71
Lubricants	5	1	3	4	5	5	6	4	4	2	3	2	44
Asphalt	------	------	------	1	26	4	18	------	------	------	------	8	57
Total	343	356	477	648	436	525	596	624	531	336	393	491	5,756
Imports from foreign countries:													
Gasoline	1	2	2	1	1	------	1	1	2	------	2	1	14
Exports to foreign countries:													
Gasoline	4	9	5	6	6	11	8	14	11	5	8	4	91
Distillate fuel oil	42	44	26	13	12	16	6	6	13	1	18	11	208
Total	46	53	31	19	18	27	14	20	24	6	26	15	299
Bulk terminal stocks in Alaska: [1]													
Gasoline	263	269	324	407	342	352	347	336	301	340	319	333	333
Kerosine	11	11	14	16	14	15	11	12	12	9	16	17	17
Distillate fuel oil	368	365	494	539	513	536	479	432	484	435	413	481	481
Residual fuel oil	54	54	83	78	94	89	79	91	86	92	93	117	117
Jet fuel	16	16	16	14	12	12	15	30	18	15	18	13	13
Lubricants	2	1	2	2	3	3	3	3	3	3	3	3	3
Asphalt	------	------	------	------	21	19	24	19	3	1	1	9	9
Total	714	716	933	1,056	999	1,026	958	923	907	895	863	973	973
Domestic demand, Alaska:													
Gasoline	103	83	126	217	157	189	254	247	207	89	112	139	1,923
Kerosine	2	------	------	------	2	------	5	4	3	3	------	1	20
Distillate fuel oil	190	169	82	268	235	254	276	319	232	186	183	181	2,575
Residual fuel oil	14	42	20	8	71	10	97	61	47	50	90	35	545
Jet fuel	------	7	1	9	2	7	------	------	16	10	13	9	74
Lubricants	5	2	2	4	4	5	6	4	4	2	3	2	43
Asphalt	------	------	------	1	5	6	13	5	16	2	------	------	48
Total	314	303	231	507	476	471	651	640	525	342	401	367	5,228

[1] Alaska stocks on Dec. 31, 1958, as follows: gasoline, 244,000 barrels; kerosine, 9,000 barrels; distillate fuel oil, 407,000 barrels; residual fuel oil, 52,000 barrels; jet fuel, 16,000 barrels; and lubricants, 2,000 barrels.

Other Products.—The total demand for all other products includes crude-oil exports and losses and refinery shortage and overage. Domestic demand for other products in 1959 rose 8.5 percent. The demand for each product included in this group increased for the year. The increases in domestic demand, by products, in 1959 were as follows: Miscellaneous oils 21.1 percent, liquefied gases 19 percent,

Digitized by Google

coke 14.2 percent, jet fuel 10.6 percent, lubricating oils 8.1 percent, asphalt 6.3 percent, wax 6 percent, road oil 2.7 percent, and still gas 1.6 percent. The net crude-oil and refinery loss for the year was 27.5 million barrels, 21.5 percent higher than in 1958.

Shipments to U.S. Territories and Possessions.—Domestic demand, as defined in this chapter, refers to demand in all States of the United States. Beginning with 1959, Alaskan demand for petroleum is included with the other States. Shipments from the United States to Territories and possessions are included with exports. Any foreign receipts into these areas are not included in the total imports shown.

Shipments from Territories and possessions to foreign countries are excluded from total exports. Shipments from Territories to the United States are included in imports.

Because 1959 is the first year that data on Alaska are included with the United States, a separate supply and demand balance for this State is shown in table 5.

SCOPE OF REPORT

This report deals primarily with statistics on production, refining, distribution, and indicated consumption of crude petroleum and refined products in the United States. The object of limiting data to the United States is to permit a breakdown and balancing of supply and demand of operations by States and districts. The composition of the districts used by the Bureau of Mines is explained in the next section.

The increasing volume of natural-gas liquids recovered from natural gas has made it necessary to include data on these liquids with the crude-oil data, as they are either blended with refinery products or are identical with materials recovered from refinery gases. These natural-gas liquids are recovered at special plants away from the oil refineries.

Most of the data were compiled by the Bureau of Mines from detailed reports, submitted on a voluntary basis by the various companies. These data are published monthly for release about 6 weeks after the end of the month concerned. Complete coverage, with only minor estimates, is procured for production, stocks, and refinery operations. The Bureau of Mines used the import data as reported by the refineries for crude oil and unfinished oils. Other product imports and all export data were taken from records of the U.S. Department of Commerce.

The impossibility of contacting many small producers to obtain current monthly data on crude-oil production makes it necessary to use pipeline company reports. These companies report by States of origin, stocks on leases, oil taken from the leases, pipeline and tank-farm stocks, and crude deliveries. The data are cross-checked against reports from refineries showing crude receipts by States of origin and method of transportation. These reports include information covering final receipts by water, tank cars, and trucks and cover stocks of crude oil, held at refineries, by States of origin. The data are checked further against available current and annual production figures collected by State agencies and supplemented by estimates of

569112—60——23

Digitized by Google

unreported lease stocks. The Bureau of Mines crude production figure includes some field condensate dumped in crude lines that cannot be identified when received at refineries and included with the crude runs reported.

Individual refineries reported monthly receipts, input, stocks at the beginning and end of the month, refinery production, and deliveries. Data on both product stocks at refineries and pipeline and bulk terminal stocks are collected.

Annual canvasses provide supplemental information on the value of crude petroleum at wells; number of producing oil wells; sales of fuel oils, asphalt, and road oils by uses; and refinery capacity. The table showing world production of crude oil by countries is based on monthly reports that also included data on crude movements and refinery operations. Data on crude reserves, wells drilled, and current prices were taken from the sources indicated in the footnotes.

DISTRICTS

The Bureau of Mines reported production of crude petroleum and natural-gas liquids and the number of wells drilled by States. Louisiana, New Mexico, and Texas were also reported by districts.

Louisiana is divided into a Northern Louisiana district and a Louisiana Gulf Coast district. The Gulf Coast district includes Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, and Washington Parishes and all parishes in the State south of these. All parishes not included in the Gulf Coast district are in the Northern Louisiana district.

New Mexico has two widely separated producing areas. The Southeastern district comprises mainly Lea, Eddy, Chaves, and Roosevelt Counties. The Northwestern district comprises mainly San Juan, Rio Arriba, Sandoval, and McKinley Counties.

The Bureau of Mines producing districts in Texas correspond, with one exception, to groupings of the Texas Railroad Commission districts.

Bureau of Mines district:	*Railroad Commission district*
Gulf Coast	Nos. 2 and 3.
West Texas	Nos. 7C and 8.
East Proper	Part of No. 6 (East Texas field in Cherokee, Smith, Upshur, Rush, and Gregg Counties).
Panhandle	No. 10.
Rest of State:	
North	Nos. 7B and 9.
Central	No. 1.
South	No. 4.
Other East Texas	Nos. 5 and 6 (exclusive of East Proper).

The Bureau of Mines groups refinery operations into another set of districts called refining districts. These refining districts correspond with the grouping originated by the Petroleum Administration for War during World War II and called PAW districts (later changed to PAD districts).

Digitized by Google

PAD district: *Refining districts*

1 *East Coast*—District of Columbia and Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida; the following counties of New York: Cayuga, Tompkins, Chemung and all counties east and north thereof; and the following counties of Pennsylvania: Bradford, Sullivan, Columbia, Montour, Northumberland, Dauphin, York, and all counties east thereof.

1 *Appalachian No. 1*—West Virginia and those parts of Pennsylvania and New York not included in the East Coast district.

2 *Appalachian No. 2*—The following counties of Ohio: Erie, Huron, Crawford, Marion, Delaware, Franklin, Pickaway, Ross, Pike, Scioto, and all counties east thereof.

2 *Indiana–Illinois–Kentucky*—Indiana, Illinois, Kentucky, Tennessee, Michigan, and that part of Ohio not included in the Appalachian district.

2 *Oklahoma–Kansas–Missouri*—Oklahoma, Kansas, Missouri, Nebraska, and Iowa.

2 *Minnesota–Wisconsin–North Dakota–South Dakota*—Minnesota, Wisconsin, North Dakota, and South Dakota.

3 *Texas Inland*—Texas, except the Texas Gulf Coast district.

3 *Texas Gulf Coast*—The following counties of Texas: Newton, Orange, Jefferson, Jasper, Tyler, Hardin, Liberty, Chambers, Polk, San Jacinto, Montgomery, Harris, Galveston, Waller, Fort Bend, Brazoria, Wharton, Matagorda, Jackson, Victoria, Calhoun, Refugio, Aransas, San Patricio, Nueces, Kleberg, Kenedy, Willacy, and Cameron.

3 *Louisiana Gulf Coast*—The following parishes of Louisiana: Vernon, Rapides, Avoyelles, Pointe Coupee, West Feliciana, East Feliciana, Tangipahoa, St. Helena, Washington, and all parishes south thereof; the following counties of Mississippi: Pearl River, Stone, George, Hancock, Harrison, and Jackson; and Mobile and Baldwin Counties, Ala.

3 *North Louisiana–Arkansas*—Arkansas and those parts of Louisiana, Mississippi, and Alabama not included in the Louisiana Gulf Coast district.

3 *New Mexico*—New Mexico.

4 *Rocky Mountain*—Montana, Idaho, Wyoming, Utah, and Colorado.

5 *West Coast*—Washington, Oregon, California, Nevada, Alaska, and Arizona.

WORLD OIL SUPPLY

The 1959 world production of crude oil was 7,127 million barrels, an increase of 7.9 percent over 1958. The United States produced 36.1 percent of the total compared with 37 percent in 1958.

Crude oil processed at refineries throughout the world totaled 7,086 million barrels in 1959, compared with 6,546 million in 1958. Refineries in the United States refined 41.2 percent of the total crude processed in 1959.

RESERVES

The American Petroleum Institute (API) Committee on Petroleum Reserves estimated proved reserves of crude oil in the United States to be 31.7 billion barrels on December 31, 1959, an increase of 1.2 billion for the year.

The estimates of crude-oil reserves include only oil recoverable under existing economic and operating conditions.

Digitized by Google

TABLE 6.—Estimates of proved crude oil reserves in the United States on December 31, 1952–59, by States [1]

(Million barrels)

State	1952	1953	1954	1955	1956	1957	1958	1959
Eastern States:								
Illinois	619	625	658	691	700	655	608	594
Indiana	56	62	67	62	68	67	71	74
Kentucky	56	82	85	107	149	138	126	136
Michigan	57	61	60	59	55	49	45	55
New York	53	49	46	43	40	37	36	34
Ohio	27	32	37	56	64	68	71	74
Pennsylvania	122	111	102	93	135	126	120	114
West Virginia	37	36	37	47	51	53	52	51
Total	1,027	1,058	1,092	1,158	1,262	1,193	1,129	1,132
Central and Southern States:								
Arkansas	352	358	351	330	318	305	318	313
Kansas	917	913	979	998	992	947	922	917
Louisiana [2]	2,558	2,760	2,962	3,255	3,675	3,858	4,044	4,660
Mississippi	359	350	412	388	368	360	379	389
Nebraska	22	26	38	57	63	63	69	81
New Mexico	733	815	806	820	836	832	894	1,026
North Dakota	76	128	134	185	196	258	314	382
Oklahoma	1,558	1,752	1,055	2,016	2,010	1,941	1,898	1,965
Texas [2]	14,916	14,999	14,982	14,934	14,783	14,555	14,322	14,860
Total	21,491	22,101	22,619	22,983	23,241	23,119	23,160	24,493
Mountain States:								
Colorado	306	319	329	334	364	310	392	381
Montana	156	209	272	299	331	320	338	309
Utah	42	38	36	37	61	140	199	195
Wyoming	1,065	1,279	1,304	1,374	1,363	1,420	1,409	1,403
Total	1,569	1,845	1,941	2,044	2,119	2,190	2,338	2,288
Pacific Coast States: California [2]	3,854	3,920	3,889	3,801	3,771	3,760	3,866	3,763
Other States [3]	20	21	20	26	42	38	43	43
Total United States	27,961	28,945	29,561	30,012	30,435	30,300	30,536	31,719

[1] From reports of Committee on Petroleum Reserves, API. Includes crude oil that may be extracted by present methods from fields completely developed or sufficiently explored to permit reasonably accurate calculations. The change in reserves during any year represents total new discoveries, extensions, and revisions, minus production.

[2] Includes offshore reserves.

[3] Includes Alabama, Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, Washington, and Alaska for 1959 only.

CRUDE PETROLEUM

SUPPLY AND DEMAND

The new supply of crude petroleum is derived primarily from domestic production, but the supply is augmented by imports. Crude imports represented 12 percent of the crude supply in 1959 compared with 12.4 percent in 1958. Mandatory import controls were put into effect in March 1959, replacing the Voluntary Oil Import Control Program that had been operating since July 1957. The new system granted import quotas for crude oil and unfinished oils for further processing to all refiners based on refinery throughout, with special provisions for refineries who imported crude oil in 1957, the base year for the program.

Virtually all of the indicated demand for crude petroleum is converted into products before final consumption (99.5 percent in 1959). The remainder represents exports, fuel, and losses.

Digitized by Google

TABLE 7.—Supply and demand [1] for crude petroleum in the United States, 1955–59

(Thousand barrels)

	1955	1956	1957	1958	1959 [2 3]	1959 [2 4]
Production	2,484,428	2,617,283	2,616,901	2,448,987	2,574,403	2,574,590
Imports [5]	285,421	341,833	373,255	348,007	352,519	352,344
Total new supply	2,769,849	2,959,116	2,990,156	2,796,994	2,926,922	2,926,934
Increase (+) or decrease (−) in stocks, end of year	+7,225	+404	+15,799	−19,083	−5,613	−5,601
Demand:						
Domestic crude	2,478,889	2,616,826	2,605,781	2,466,357	2,578,016	2,578,191
Foreign crude	283,735	341,886	368,576	349,720	354,519	354,344
Total demand	2,762,624	2,958,712	2,974,357	2,816,077	2,932,535	2,932,535
Runs to stills:						
Domestic	2,446,833	2,563,655	2,529,672	2,444,229	2,565,504	2,565,504
Foreign	283,385	341,451	360,764	345,175	352,157	352,157
Exports [6]	11,571	28,624	50,243	4,346	2,526	2,526
Transfers to fuel oil:						
Distillate	1,347	1,375	1,305	950	970	970
Residual	5,559	6,439	13,884	10,965	7,386	7,386
Other fuel losses	13,929	17,168	18,489	10,412	3,992	3,992
Total demand	2,762,624	2,958,712	2,974,357	2,816,077	2,932,535	2,932,535

[1] For definition, see footnote 4 at the beginning of this chapter.
[2] Preliminary figures.
[3] Old basis, comparable to 1958, that is excluding Alaska.
[4] New basis, includes Alaska as part of the United States.
[5] Bureau of Mines data.
[6] U.S. Department of Commerce.

Digitized by Google

TABLE 8.—Supply of and demand for crude petroleum in the United States 1958–59, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Supply:													
Production	213,280	190,947	194,580	189,014	193,205	190,172	203,701	215,030	212,642	215,887	209,252	221,277	2,448,987
Imports [1]	31,747	23,232	31,366	25,835	28,972	28,802	26,916	29,865	29,927	28,885	29,026	33,434	348,007
Total new supply	245,027	214,179	225,946	214,849	222,177	218,974	230,617	244,895	242,569	244,772	238,278	254,711	2,796,994
Change in stocks, end of period:													
Domestic	1,373	3,265	−8,414	−4,053	−10,821	−8,654	−7,029	177	5,311	4,342	2,891	4,242	−17,370
Foreign	1,353	−2,756	1,900	−522	−33	−901	35	−1,923	1,580	−698	−690	942	−1,713
Demand:													
Domestic	211,907	187,682	202,994	193,067	204,026	198,826	210,730	214,853	207,331	211,545	206,361	217,035	2,466,357
Foreign	30,394	25,988	29,466	26,357	29,005	29,703	26,881	31,788	28,347	29,583	29,716	32,492	349,720
Runs to stills:													
Domestic	209,870	186,510	200,674	191,377	202,321	197,576	208,519	212,247	205,562	209,892	204,483	215,198	2,444,229
Foreign	29,506	25,456	28,566	25,761	28,586	29,401	26,877	31,301	28,039	29,557	29,673	32,452	345,175
Exports [2]	425	213	838	643	503	216	308	334	170	330	292	74	4,346
Transfers:													
Distillate	93	86	85	84	74	72	72	72	76	76	78	82	950
Residual	1,386	983	1,464	1,054	885	701	571	1,250	956	610	511	594	10,965
Losses	1,021	422	833	505	662	563	1,264	1,437	875	663	1,040	1,127	10,412
1959 [3 4]													
Supply:													
Production	223,900	201,420	222,836	217,685	223,802	212,473	210,290	209,715	205,683	214,226	209,428	222,945	2,574,403
Imports [1]	28,684	29,482	28,121	22,271	29,089	36,158	27,534	29,955	29,507	30,377	29,442	31,899	352,519
Total new supply	252,584	230,902	250,957	239,956	252,891	248,631	237,824	239,670	235,190	244,603	238,870	254,844	2,926,922
Change in stocks, end of period:													
Domestic	−2,396	−632	−3,812	4,441	5,020	3,371	−3,053	−11,956	−2,607	6,484	448	1,079	−3,613
Foreign	−2,244	2,564	−1,293	−1,818	1,945	4,614	−4,461	59	508	7	−1,982	101	−2,000
Demand:													
Domestic	226,284	202,052	226,638	213,242	218,790	209,112	213,337	221,683	208,282	207,742	208,980	221,874	2,578,016
Foreign	30,928	26,918	29,414	24,089	27,144	31,544	31,995	29,896	28,999	30,370	31,424	31,798	354,519
Runs to stills:													
Domestic	224,820	201,114	225,553	212,080	217,657	208,102	212,355	220,664	207,369	206,740	208,118	220,932	2,565,504
Foreign	30,304	26,448	28,869	23,902	27,132	31,505	31,961	29,844	28,957	30,326	31,399	31,510	352,157
Exports [2]	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Transfers:													
Distillate	89	83	89	82	81	79	75	74	72	77	79	90	970
Residual	1,053	898	1,038	731	485	480	457	448	442	414	378	562	7,386
Losses	594	330	325	306	312	298	310	312	290	297	298	320	3,992

Digitized by Google

1959 [3] [4]													
Supply:													
Production	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590
Imports [1]	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344
Total new supply	252,590	230,902	250,952	239,955	252,895	248,636	237,821	239,676	235,186	244,603	238,870	254,848	2,926,934
Change in stocks, end of period:													
Domestic	−2,378	−632	−3,807	4,442	5,016	3,366	−8,050	−11,962	−2,603	6,484	448	1,075	−3,601
Foreign	−2,244	2,564	−1,293	−1,818	1,945	4,614	−4,461	59	508	7	−1,982	101	−2,000
Demand:													
Domestic	226,304	202,067	226,646	213,243	218,790	209,123	213,361	221,695	208,303	207,764	209,001	221,894	2,578,191
Foreign	30,908	26,903	29,406	24,088	27,144	31,533	31,971	29,884	28,978	30,348	31,403	31,778	354,344
Runs to stills:													
Domestic	224,820	201,114	225,553	212,080	217,657	208,102	212,355	220,664	207,369	206,740	208,118	220,932	2,565,504
Foreign	30,304	26,448	28,869	23,902	27,132	31,505	31,961	29,844	28,957	30,326	31,399	31,510	352,157
Exports [2]	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Transfers:													
Distillate	89	83	89	82	81	79	75	74	72	77	79	90	970
Residual	1,053	898	1,038	731	485	480	457	448	442	414	378	562	7,386
Losses	594	330	325	306	312	298	310	312	290	297	298	320	3,992

[1] Bureau of Mines figures.
[2] U.S. Department of Commerce, except Alaska (before 1959 new basis) and Hawaii, which are Bureau of Mines data.
[3] Preliminary figures.
[4] Old basis; comparable to 1958, that is, excluding Alaska.
[5] New basis; includes Alaska as part of the United States.

Digitized by Google

TABLE 9.—Petroleum produced in the United States, 1955–59, and total 1859–1959, by States [1]

(Thousand barrels)

	1955	1956	1957	1958	1959 [2]	1859–1959 total
Production:						
Alabama	1,411	3,069	5,406	5,887	5,019	28,998
Arkansas	28,369	29,355	31,047	28,700	26,329	1,058,088
California	354,812	350,754	339,646	313,672	307,327	11,720,695
Colorado	52,653	58,516	54,982	48,736	46,150	547,208
Florida	495	479	461	449	424	6,161
Illinois	81,423	82,346	77,083	80,275	78,435	2,152,221
Indiana	10,988	11,513	12,662	11,864	12,003	307,018
Kansas	121,669	124,204	123,614	119,942	119,514	[3] 3,198,233
Kentucky	15,518	17,628	17,029	17,509	26,343	[4] 394,901
Louisiana	271,010	299,421	329,896	313,891	354,611	5,106,468
Michigan	11,266	10,740	10,169	9,308	10,438	[5] 425,660
Mississippi	37,741	40,824	38,922	39,512	47,928	631,734
Montana	15,654	21,760	27,172	27,957	30,079	335,511
Nebraska	11,203	16,204	19,586	20,373	23,669	116,415
Nevada	64	64	44	40	32	277
New Mexico	82,958	87,893	94,759	98,515	105,692	[6] 1,408,313
New York	2,904	2,748	2,677	1,763	1,981	[7] 194,227
North Dakota	11,143	13,495	13,259	14,259	17,960	82,898
Ohio	4,353	4,785	5,478	6,260	5,566	661,385
Oklahoma	202,817	215,862	214,661	200,699	196,487	8,031,880
Pennsylvania	8,531	8,230	8,179	6,472	6,156	1,215,367
Texas	1,053,297	1,107,808	1,073,867	940,166	983,840	22,913,108
Utah	2,227	2,466	4,367	24,811	40,109	[8] 82,446
West Virginia	2,320	2,179	2,215	2,186	2,177	463,336
Wyoming	99,483	104,830	109,584	115,572	125,968	1,785,379
Other States [9]	119	110	136	[10] 169	[11] 353	3,060
Total	2,484,428	2,617,283	2,616,901	[10] 2,448,987	[11] 2,574,590	62,870,987
Value at wells:						
Total (thousand dollars)	6,870,380	7,296,760	8,079,259	7,379,973	7,476,369	119,621,269
Average per barrel	$2.77	$2.79	$3.09	$3.01	$2.90	$1.90

[1] For detailed figures by States, 1859–1935, see Minerals Yearbook, 1937, p. 1008.
[2] Preliminary figures.
[3] Oklahoma included with Kansas in 1905 and 1906.
[4] Includes Tennessee, 1883–1907.
[5] Figures represent 1925–59 production only; earlier years included with "Other States."
[6] Figures represent 1924–59 production only; earlier years included with "Other States."
[7] Early production in New York included with Pennsylvania.
[8] Figures represent 1946–59 production only; earlier years included with "Other States."
[9] Includes Alaska 1912–33, 1959; Arizona, 1958–59; Arkansas, 1920; Michigan, 1900–1919; Mississippi, 1933–35; Missouri, 1899–1911, 1913–16, 1919–23, 1932–59; New Mexico, 1913, 1919–23; South Dakota, 1955–59; Tennessee 1916–59; Utah, 1907–11, 1920, 1924–41; Virginia, 1943–59; Washington, 1958–59.
[10] Does not include 29,000 barrels produced in Alaska.
[11] Includes 187,000 barrels produced in Alaska.

PRODUCTION

GENERAL

Production of crude petroleum in 1959 totaled 2,574.6 million barrels, an average of 7,054,000 barrels daily compared with 6,710,000 barrels daily in 1958.

During the first half of 1959, production averaged 7,194,000 barrels daily but dropped to 6,915,000 during the last half of the year when general industrial activity was affected by the steel strike.

In 1959, New Mexico joined the list of States that annually produce in excess of 100 million barrels of crude oil. The other States in this group are Texas, Louisiana, California, Oklahoma, Wyoming, and Kansas, and production from these States accounted for 85.2 percent of the U.S. total.

BY STATES

Additional data on production by States will be found in volume III of the Minerals Yearbook.

Digitized by Google

TABLE 10.—Production of crude petroleum in the United States in 1958–59, by States and months [1]

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Alabama	486	427	525	488	460	450	594	465	470	580	463	479	5,887
Arkansas	2,612	2,403	2,339	2,407	2,258	2,328	2,441	2,397	2,269	2,487	2,343	2,416	28,700
California [2]	28,433	24,734	26,937	25,666	26,246	25,462	26,167	26,351	25,432	26,451	25,577	26,216	313,672
Colorado [3]	4,292	3,897	4,316	4,110	4,195	3,949	4,132	4,040	3,886	4,089	3,838	3,992	48,736
Florida	38	36	39	38	38	37	37	38	37	36	38	37	449
Illinois	7,049	5,893	6,595	6,696	6,708	6,589	6,949	6,838	6,682	6,841	6,536	6,899	80,275
Indiana	995	845	1,001	1,006	978	999	1,032	921	915	1,095	1,035	1,042	11,864
Kansas	10,545	9,051	9,000	9,723	9,838	9,730	10,147	10,376	10,312	10,687	9,989	10,544	119,942
Kentucky	1,377	1,103	1,320	1,374	1,353	1,335	1,434	1,412	1,499	1,609	1,719	1,884	17,509
Louisiana	26,276	23,979	25,568	24,762	25,191	24,467	25,827	26,545	26,875	27,878	27,656	28,867	313,891
Michigan [4]	782	686	808	789	782	760	789	753	782	793	738	846	9,308
Mississippi	3,095	2,837	2,962	2,910	3,144	3,168	3,400	3,656	3,507	3,616	3,602	3,615	39,512
Montana [5]	2,330	2,083	2,316	2,247	2,343	2,361	2,395	2,351	2,333	2,428	2,336	2,434	27,957
Nebraska	1,717	1,515	1,566	1,516	1,603	1,703	1,791	1,878	1,734	1,868	1,720	1,762	20,373
New Mexico	8,149	7,478	7,660	7,700	8,375	7,901	8,766	8,834	8,173	8,540	8,222	8,717	98,515
New York	217	182	202	212	213	154	104	98	98	102	87	94	1,763
North Dakota [6]	1,343	1,154	1,129	1,211	1,186	1,356	1,380	1,429	761	662	1,265	1,383	14,259
Ohio	528	430	534	566	544	525	560	515	530	549	476	503	6,260
Oklahoma	17,644	15,786	16,057	16,492	16,781	15,957	17,233	17,289	16,673	17,239	16,468	17,080	200,699
Pennsylvania	597	484	553	582	571	550	574	510	560	541	465	485	6,472
Texas	84,728	76,918	72,909	68,263	68,776	68,656	74,838	84,624	86,110	83,697	82,282	88,365	940,166
Utah [7]	559	535	453	1,074	2,219	2,504	2,796	3,178	2,989	3,392	2,233	2,879	24,811
West Virginia	181	147	183	201	183	185	193	172	198	198	171	174	2,186
Wyoming	9,287	8,328	9,589	8,962	9,205	9,027	10,104	10,343	9,799	10,401	9,982	10,545	115,572
Other States	20	16	19	19	15	19	18	17	18	18	11	19	[8] 209
Total: 1958	213,280	190,947	194,580	189,014	193,205	190,172	203,701	215,030	212,642	215,887	209,252	221,277	2,448,987
1957	231,631	214,967	238,490	226,392	230,466	213,302	212,781	210,150	206,777	212,055	205,249	214,641	2,616,901
Daily average, 1958	6,880	6,820	6,277	6,300	6,232	6,339	6,571	6,936	7,088	6,964	6,975	7,138	6,710
Pennsylvania Grade (included above)	1,139	930	1,095	1,157	1,125	997	995	896	973	975	838	884	12,004
1959 [9]													
Alabama	472	266	327	432	453	446	492	385	403	463	415	465	5,019
Arkansas	2,510	2,116	2,276	2,433	2,490	2,439	2,212	1,950	2,005	1,940	1,883	2,075	26,329
California [2]	26,186	23,498	26,135	25,271	26,265	25,485	26,175	26,085	25,211	25,944	25,163	25,909	307,327
Colorado [3]	3,885	3,585	3,943	3,821	3,875	3,729	3,833	3,918	3,790	3,983	3,794	3,994	46,150
Florida	39	29	37	36	36	36	34	36	34	37	34	36	424
Illinois	6,906	6,141	6,535	6,500	6,427	6,405	6,584	6,589	6,411	6,672	6,440	6,825	78,435
Indiana	1,041	876	1,014	978	1,167	968	1,042	997	946	997	940	1,037	12,003
Kansas	10,415	9,223	10,530	10,302	9,906	9,842	9,896	9,575	9,779	10,094	9,740	10,212	119,514
Kentucky	1,983	1,791	2,127	2,432	2,634	2,521	2,372	2,197	2,161	2,157	1,970	1,998	26,343
Louisiana	29,224	26,583	28,195	28,884	30,029	28,346	28,901	29,904	29,380	31,541	31,016	32,608	354,611

Digitized by Google

TABLE 10.—Production fo crude petroleum in the United States in 1958–59, by States and months [1]—Continued

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
Michigan [4]	780	714	815	828	810	865	880	892	885	917	981	1,071	10,438
Mississippi	3,734	3,329	3,799	3,770	3,917	3,866	4,026	4,196	4,076	4,398	4,281	4,536	47,928
Montana [5]	2,460	2,323	2,596	2,434	2,418	2,537	2,639	2,561	2,523	2,541	2,441	2,606	30,079
Nebraska	1,835	1,592	1,624	1,887	2,082	2,074	2,035	2,173	2,098	2,146	2,040	2,083	23,669
New Mexico	8,489	7,819	8,980	8,907	8,921	8,830	9,086	8,828	8,780	8,950	8,877	9,225	105,692
New York	188	143	159	160	158	170	168	167	166	168	164	170	1,981
North Dakota [6]	1,474	1,384	1,600	1,429	1,454	1,546	1,547	1,512	1,502	1,147	1,478	1,887	17,960
Ohio	436	435	485	497	455	488	500	465	470	459	416	460	5,566
Oklahoma	17,154	15,924	17,451	17,143	16,978	16,068	15,545	15,264	15,182	16,250	16,402	17,126	196,487
Pennsylvania	479	456	498	515	511	520	518	503	529	537	531	559	6,156
Texas	90,300	80,764	89,443	85,118	88,903	81,166	77,118	76,901	75,516	78,366	76,801	83,444	983,840
Utah [7]	3,339	3,033	3,455	3,239	3,377	3,547	3,522	3,364	3,233	3,319	3,153	3,528	40,109
West Virginia	170	166	181	188	174	188	188	178	189	194	171	190	2,177
Wyoming	10,388	9,226	10,624	10,474	10,354	10,383	10,966	11,052	10,387	10,977	10,265	10,872	125,968
Other States	39	19	10	7	12	24	32	41	44	51	53	53	[10] 385
Total: 1959	223,926	201,435	222,839	217,685	223,806	212,489	210,311	209,733	205,700	214,248	209,449	222,969	2,574,590
1958	213,280	190,947	194,580	189,014	193,205	190,172	203,701	215,030	212,642	215,887	209,252	221,277	2,448,987
Daily average, 1959	7,223	7,194	7,188	7,256	7,220	7,083	6,784	6,766	6,857	6,911	6,982	7,193	7,054
Pennsylvania Grade (included above)	952	886	970	990	964	1,011	1,015	984	1,012	1,025	976	1,046	11,831

[1] Includes some field condensate.
[2] Conservation Committee of California Oil Producers.
[3] Colorado Oil and Gas Conservation Commission.
[4] Michigan Department of Conservation.
[5] Montana Oil Conservation Board.
[6] North Dakota Geological Survey.
[7] Utah Oil and Gas Conservation Commission.
[8] Includes Arizona (12), Missouri (84), Nevada (40), South Dakota (58), Tennessee (7), Virginia (4), and Washington (4), but does not include Alaska (29).
[9] Preliminary figures.
[10] Alaska (187), Arizona (34), Nevada (32), South Dakota (119), Tennessee (6), Virginia (6), and Washington (1).

Digitized by Google

TABLE 11.—Percentage of total crude petroleum produced in the United States, 1950–59, by States

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959 [1]
Texas	42.1	45.0	44.6	43.2	42.1	42.4	42.3	41.0	38.4	38.2
Louisiana	10.6	10.3	10.7	10.9	10.6	10.9	11.4	12.6	12.8	13.8
California	16.6	15.8	15.7	15.5	15.4	14.3	13.4	13.0	12.8	11.9
Oklahoma	8.3	8.3	8.3	8.6	8.0	8.2	8.2	8.2	8.2	7.6
Wyoming	3.1	3.1	3.0	3.5	4.0	4.0	4.0	4.2	4.7	4.9
Kansas	5.5	5.1	5.0	4.9	5.2	4.9	4.7	4.7	4.9	4.6
New Mexico	2.4	2.3	2.6	3.0	3.2	3.3	3.4	3.6	4.0	4.1
Illinois	3.1	2.7	2.6	2.5	2.9	3.3	3.1	2.9	3.3	3.1
Mississippi	1.9	1.7	1.6	1.5	1.5	1.5	1.6	1.5	1.6	1.9
Colorado	1.2	1.2	1.3	1.5	2.0	2.1	2.2	2.1	2.0	1.8
Montana	.4	.4	.4	.5	.6	.6	.8	1.0	1.1	1.2
Arkansas	1.6	1.3	1.3	1.3	1.3	1.1	1.1	1.2	1.2	1.0
Kentucky	.5	.5	.5	.5	.6	.6	.7	.7	.7	1.0
Michigan	.8	.6	.6	.5	.5	.5	.4	.4	.4	.4
Other States	1.9	1.7	1.8	2.1	2.1	2.3	2.7	2.9	3.9	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Preliminary figures.

TABLE 12.—Production of crude petroleum in leading fields in the United States, 1958–59, and total production since discovery,[1] in thousand barrels

[Oil and Gas Journal]

Field	State	1958	1959	Total since discovery [2]
East Texas	Texas	46,195	52,992	3,411,098
Wilmington	California	29,717	26,974	856,408
Sho-Vel-Tum	Oklahoma	25,823	25,175	524,721
Coalinga, all fields	California	21,803	21,517	822,421
Elk Basin	Montana, Wyoming	16,576	21,438	163,156
Goldsmith	Texas	8,615	20,164	275,829
Kelly-Snyder	do	16,339	20,056	241,507
Ventura	California	21,105	18,876	622,835
Huntington Beach	do	19,512	18,212	651,057
Rangely	Colorado	20,914	17,980	282,879
South Pass, Block 24	Louisiana	15,067	16,423	84,704
Caillou Island	do	10,856	15,062	143,156
Seeligson (all zones)	Texas	7,932	14,918	184,269
Ward-Estes, North	do	11,196	14,616	99,530
Burbank	Oklahoma	14,548	14,463	362,839
Cowden, all fields	Texas	11,006	14,086	316,502
Midway-Sunset	California	13,107	13,157	869,416
Wasson (66 and 72)	Texas	9,496	12,692	342,919
Cuyama, South	California	12,461	12,590	127,127
Loudon	Illinois	13,158	12,586	235,394
Spraberry Trend	Texas	11,150	12,086	130,301
San Ardo	California	10,878	11,010	90,704
Lake Washington	Louisiana	9,599	10,902	51,841
Golden Trend	Oklahoma	13,106	10,627	177,322
Timbalier Bay	Louisiana	8,558	10,220	44,892
Aneth	Utah	9,948	10,200	20,298
Hawkins	Texas	8,782	9,845	251,701
McElroy	do	7,610	9,810	177,482
Buena Vista	California	6,862	9,769	480,155
Hastings	Texas	5,712	9,290	303,630
Katy, North	do	503	9,232	124,277
McElmo Creek	Utah	3,219	9,191	12,138
Slaughter	Texas	7,100	9,062	260,437
Kern Front and Kern River	California	6,568	8,384	445,003
Eunice-Monument	New Mexico	11,674	7,896	299,306
Diamond M	Texas	5,220	7,627	91,532
Ratherford (Desert Creek, North)	Utah	4,286	7,571	11,267
Weeks Island	Louisiana	6,796	7,476	89,686
Main Pass, Block 69	do	6,917	7,417	38,161
South Mountain	California	7,007	7,375	80,440
Clay City	Illinois	7,972	7,269	211,874
Greensburg	Kentucky	1,644	7,200	8,944
Denton	New Mexico	7,968	7,141	69,867
Beaver Lodge-Tioga	North Dakota	6,448	7,048	58,770
Gladiola	New Mexico	7,324	7,046	26,301
Salem	Illinois	6,475	6,926	271,507

See footnotes at end of table.

Digitized by Google

TABLE 12.—Production of crude petroleum in leading fields in the United States, 1958–59, and total production since discovery,[1] in thousand barrels—Continued

[Oil and Gas Journal]

Field	State	1958	1959	Total since discovery [2]
Webster	Texas	4,915	6,859	245,763
Hamilton Dome	Wyoming	5,903	6,793	63,084
T X L	Texas	4,547	6,759	148,553
Caprock and East	New Mexico	5,216	6,581	38,961
Bisti-Gallup	do	4,978	6,570	13,159
Howard Glasscock	Texas	5,901	6,499	206,248
Fullerton (North and South)	do	4,821	6,493	136,731
Tom O'Connor	do	5,106	6,460	245,753
White Mesa	Utah	3,365	6,390	9,231
Yates	Texas	5,427	6,372	462,293
Levelland	do	5,402	6,346	113,083
Caddo	Louisiana	6,493	6,334	251,487
West Delta, Block 30	do	4,476	6,314	14,978
Bridgeport (old)	Illinois	5,280	6,264	277,279
Bradford-Allegheny [3]	Pennsylvania–New York	6,459	6,237	688,957
Bay Marchand, Block 2	Louisiana	8,421	6,093	32,155
Cogdell (all fields)	Texas	3,919	6,047	64,653
Conroe	do	5,998	6,017	382,832
Keystone	do	4,894	5,963	164,547
Emma (& Triple N)	do	3,934	5,961	35,405
Long Beach	California	6,185	5,869	817,954
Brea-Olinda	do	6,379	5,865	270,128
Block 31	Texas	5,716	5,809	54,266
Baxterville	Mississippi	4,819	5,801	71,925
Thompson, all fields	Texas	8,558	5,673	235,640
Coles Levee, North and South	California	5,432	5,626	123,004
South Pass, Block 27	Louisiana	3,579	5,620	13,732
Oregon Basin and West	Wyoming	4,714	5,557	92,760
Little Creek	Mississippi	1,440	5,460	6,885
Delhi	Louisiana	5,320	5,433	105,126
Russel and North	Texas	4,325	5,422	41,095
Salt Creek	Wyoming	4,865	5,398	379,554
Garland and South	do	4,154	5,325	54,350
Van & Van Shallow	Texas	4,702	5,312	287,115
Kermit	do	4,892	5,271	64,862
Agua Dulce-Stratton	do	5,249	5,222	151,623
Sand Hills	do	4,422	5,189	78,648
Elk Hill	California	5,375	5,154	252,570
Old Ocean	Texas	4,628	5,129	98,251

[1] Fields under 5 million barrels not shown for current year.
[2] Includes revisions.
[3] Bureau of Mines data.

TABLE 13.—Production of crude petroleum in Arkansas, 1955–59, by fields

(Thousand barrels)

Field	1955	1956	1957	1958	1959 [1]
Atlanta	483	438	399	228	148
Bradley West		499			
Buckner	478	444	415	363	332
Dorcheat-Macedonia	617	632	721	303	314
El Dorado	857	923	990	826	646
Fouke	1,241	1,431	1,468	1,279	855
Horsehead	816	403	188		
Magnolia	2,890	3,609	4,521	4,058	4,439
McKamie	1,331	1,349	1,337	976	755
Midway	2,048	2,238	2,299	2,046	2,196
Shuler	2,593	2,353	2,119	1,791	1,849
Smackover	4,678	4,466	4,206	4,114	4,363
Stephens	1,014	1,157	1,745	1,681	1,472
Village	846	811	776	721	398
Wesson	1,840	1,591	2,491	2,239	1,525
Other fields [2]	6,637	7,011	7,372	8,075	7,037
Total Arkansas	28,369	29,355	31,047	28,700	26,329

[1] Preliminary figures.
[2] Includes oil consumed on leases and net change in stocks held on leases for entire State.

Digitized by Google

TABLE 14.—Production of crude petroleum in California, 1955–59, by districts and fields, in thousand barrels

[Conservation Committee of California Oil Producers]

District and field	1955	1956	1957	1958	1959 [1]
San Joaquin Valley:					
Belridge	4,092	4,297	4,677	4,782	4,620
Buena Vista	7,713	7,767	7,457	6,901	9,815
Coalinga	29,661	29,280	27,746	26,740	21,225
Coles Levee	6,585	5,313	5,888	5,443	4,824
Cuyama-Russell Ranch	16,132	15,940	16,215	15,084	14,544
Edison	4,951	4,568	4,135	3,808	3,527
Elk Hill	6,689	5,959	5,662	5,361	5,126
Fresno Group					3,033
Fruitvale	3,390	3,212	2,994	2,721	2,500
Gosford, East	425	443			
Greeley	4,355	4,271	3,502	2,981	2,665
Helm	512	1,009	981	829	883
Kern River-Kern Bluff-Kern Front	5,921	7,437	7,665	6,888	8,648
Kettleman North Dome	5,447	5,252	4,898	4,786	3,926
Lost Hills	1,842	1,782	1,706	1,324	1,272
McKittrick	8,503	8,984	7,807	7,018	6,512
Midway-Sunset	14,707	15,070	15,206	13,107	13,126
Mountain View	1,554	1,447	1,608	1,523	1,403
Mount Poso	3,161	2,927	3,319	3,392	3,173
Poso Creek	1,285	1,517	1,655	1,342	1,349
Raisin City	1,916	2,137	1,951	1,793	1,668
Rio Bravo	4,503	3,995	4,262	3,629	3,464
Riverdale	529	544	540	487	391
Round Mountain	1,681	1,630	1,590	1,497	1,467
Tejon Group	3,915	3,360	2,331	2,722	5,030
Ten Section	1,650	1,638	1,577	1,506	1,614
Vallecitos Group					857
Wheeler Ridge					1,849
Other San Joaquin Valley	9,037	11,702	10,421	6,587	9,851
Total San Joaquin Valley	150,225	151,481	145,793	132,251	138,362
Coastal district:					
Aliso Canyon	2,845	2,606	2,343	2,027	1,876
Cat Canyon	5,382	6,133	4,481	4,197	4,454
Del Valle	926	747	1,140	961	423
Elwood	1,291	1,205	1,050	931	721
Gato Ridge	947	966	890	756	685
Lompoc	1,247	1,047	886	153	371
Newall-Potrero	3,612	3,459	3,199	2,871	2,656
Orcutt	1,231	1,144	1,099	1,046	976
Padre Canyon [2]	1,577	1,346			
Placerita	1,834	1,590	1,458	1,333	1,126
Romona	724	612			
Rincon	1,632	3,079	3,204	3,527	3,903
San Ardo	10,972	11,733	11,845	10,864	10,994
San Miguelito	1,835	1,648	2,346	2,102	1,341
San Maria	3,012	2,713	2,544	2,198	1,968
South Mountain	4,676	4,995	6,561	6,980	7,384
Ventura	25,603	24,357	21,159	20,451	18,872
Zaca Creek	1,317	953	780	668	633
Other Coastal	14,208	12,500	20,188	20,021	18,147
Total Coastal	84,871	82,833	85,173	81,086	76,530
Los Angeles Basin:					
Brea Olinda	7,498	6,864	6,850	6,362	5,904
Coyote	4,495	4,498	4,471	3,942	2,333
Dominguez	3,448	4,366	3,992	3,710	3,417
Huntington Beach	24,107	22,468	21,452	19,447	18,110
Inglewood	4,374	4,466	4,642	4,419	4,280
Long Beach	9,948	7,748	6,761	6,167	5,841
Montebello	1,559	1,518	1,450	1,360	1,331
Newport	1,671	1,546	1,507	1,467	2,230
Richfield	2,495	2,290	2,112	2,133	2,073
Rosecrans [3]	1,281	1,185	1,119	971	906
Sansinena	3,827	3,798	3,646	2,604	2,219
Sante Fe Springs	4,591	5,193	4,444	3,890	3,334
Seal Beach	3,634	3,946	4,037	3,881	3,401
Torrance	2,573	2,614	2,715	3,084	2,615
Wilmington	38,860	36,844	32,306	31,417	26,993
Other Los Angeles Basin	5,355	7,096	7,176	5,481	7,358
Total Los Angeles Basin	119,716	116,440	108,680	100,335	92,435
Total California	354,812	350,754	339,646	313,672	307,327

[1] Preliminary figures. [2] Includes Oak Grove area. [3] Includes Athens.

Digitized by Google

TABLE 15.—Production of crude petroleum in Colorado, 1955–59, by fields

(Thousand barrels)

Field [1]	1955	1956	1957	1958	1959 [2]
Adena	6,015	5,709	5,518	4,965	6,463
Badger Creek—West	747	518	498	383	
Big Beaver	825	876	896	1,062	1,014
Black Hollow	783	676	656	549	538
Bobcat	1,200	884	625	670	535
Cliff	820	979	565	553	557
Divide	677	405			
Graylin—South and Northwest	1,588	1,051	690	631	524
Lewis Creek	674	456			
Little Beaver—East	2,089	1,993	2,282	1,754	1,666
Mt. Hope—East and North	1,024	840	566	430	689
Plum Bush Creek	665	1,232	1,062	1,138	790
Rangely	23,901	28,302	26,154	20,914	17,980
Sand River	560	483			
Wilson Creek	2,440	2,556	2,528	2,396	2,709
Yenter	904	647	621	658	509
Other [3]	7,741	10,909	12,321	12,633	12,176
Total Colorado	52,653	58,516	54,982	48,736	46,150

[1] Figures by fields supplemented with data from Oil and Gas Journal for 1959.
[2] Preliminary figures
[3] Includes crude oil consumed on leases and net change in stocks held on leases for entire State.

TABLE 16.—Production of crude petroleum in Illinois, 1955–59, by fields, in thousand barrels

[Oil and Gas Journal]

Field	1955	1956	1957	1958	1959 [1]
Albion	1,232	1,120	1,313	1,377	1,113
Benton	1,462	1,032	807	606	529
Boyd	718	899	952	668	485
Bridgeport	3,417	4,352	4,174	5,280	6,264
Centralia	563	546	2,076	3,480	2,160
Clay City	10,300	9,210	8,187	7,972	7,269
Dale	1,912	3,543	2,441	2,485	1,979
East Inman	1,067	1,513	1,415	1,537	1,126
Johnsonville	839	1,063	1,010	992	1,698
Loudon	7,535	9,828	11,691	13,158	12,586
New Harmony	4,440	4,022	3,462	4,430	4,758
Phillipstown	979	1,168	547	691	606
Robinson	2,606	2,621	2,752	2,755	3,197
Roland	2,045	2,503	2,449	2,155	1,860
Sailor Springs	1,544	1,794	1,552	1,531	1,378
Salem	7,673	6,606	5,644	6,475	6,926
Other fields [2]	33,091	30,526	26,611	24,683	24,501
Total Illinois	81,423	82,346	77,083	80,275	78,435

[1] Preliminary figures.
[2] Bureau of Mines figures.

Digitized by Google

TABLE 17.—Pipeline runs of crude petroleum in Kansas, 1955–59, by fields, in thousand barrels

[Kansas Geological Survey]

Field	1955	1956	1957	1958	1959
Bemis-Shutts	3,232	3,055	5,922	5,063	4,868
Bloomer	1,207	1,024	954	789	723
Browning	118	400	1,126	1,031	768
Burnett [1]	2,008	2,074			
Chase-Silica	3,282	3,482	4,271	3,260	3,689
Cooper	851	1,513	1,416	1,317	1,109
El Dorado	4,232	4,359	4,619	4,371	4,443
Fairport	901	980	1,061	1,065	1,040
Garfield	916	1,836	1,742	1,092	649
Genesco-Edwards	2,934	2,784	2,236	1,812	1,680
Gladys	1,014	1,810	1,859	1,638	1,202
Gorham	1,571	1,515	1,501	1,499	1,421
Hall-Gurney	4,076	3,598	3,543	3,296	3,253
Inks-Carmi	1,450	1,472	1,219	1,035	855
Kraft-Prusa	4,096	3,712	3,437	3,092	2,890
Marcotte	1,711	1,887	2,020	1,779	1,596
Morel	1,472	1,482	1,617	1,477	1,354
Ray	1,311	1,225	1,314	1,353	1,363
Rhodes	1,020	947	1,074	664	403
Ritz-Canton	1,985	1,470	1,563	1,542	1,321
Seeley-Wick	1,489	1,307	978	719	583
Silica South [2]	1,043	1,003			
Spivey-Grabs [3]	1,139	1,758	2,031	1,961	2,370
Trapp	4,797	4,241	3,728	3,366	3,120
Trico [4]		935	1,239	1,253	1,117
Unger	20	147	1,126	1,189	1,008
Welch-Bornholdt	1,238	1,106	1,240	1,216	932
Other fields	72,048	73,345	71,218	73,063	75,717
Total Kansas	121,161	124,467	124,054	119,942	119,474
Change in field stocks [5]					+40
Total Kansas production [5]	121,669	124,204	123,614	119,942	[6] 119,514

[1] Combined with Bemis-Shutts in 1957.
[2] Combined with Chase-Silica in 1957.
[3] Formed by combination of Spivey and Grabs fields in 1956.
[4] Formed in 1956 by combination of Allphin, Allphin Northwest, Annon, Annon South, Bassett, Laura Southeast, Marcotte South, Noah, Spaulding, and White Southwest fields.
[5] Bureau of Mines figures.
[6] Preliminary figure.

TABLE 18.—Production of crude petroleum in Louisiana, 1955–59, by districts and fields

(Thousand barrels)

District and field	1955	1956	1957	1958	1959 [1]
Gulf Coast:					
Anse la Butte	1,719	1,890	2,065	1,656	1,775
Avery Island	3,499	3,303	3,240	2,580	2,712
Bateman Lake		1,718	2,120	2,191	2,836
Barataria	1,358	1,103	1,023	800	761
Bay de Chene	1,456	1,609	1,794	1,600	1,913
Bay Marchand	2,933	3,539	3,791	4,684	6,390
Bay St. Elaine	3,315	3,188	3,376	3,338	3,764
Bayou Blue	955	931	1,133	913	743
Bayou Choctaw	1,293	1,176	1,204	1,131	1,361
Bayou Mallett	1,140	1,043	823	829	981
Bayou Sale	3,090	2,825	2,712	2,297	3,138
Bully Camp	1,767	1,623	1,582	1,236	1,452
Caillou Island	9,017	9,626	11,298	11,260	14,751
Charenton	1,234	1,426	1,391	1,228	$1,573$
Cox Bay	3,113	2,762	2,303	1,565	$1,348$
Delta Farms	4,810	4,493	4,010	3,285	$3,656$
Dog Lake	1,072	947	887	755	770
Duck Lake	3,329	2,916	2,477	2,282	$2,483$
East White Lake	1,390	1,390	1,463	1,111	$1,044$

See footnotes at end of table.

Digitized by Google

TABLE 18.—Production of crude petroleum in Louisiana, 1955–59, by districts and fields—Continued

(Thousand barrels)

District and field	1955	1956	1957	1958	1959 [1]
Gulf Coast—Continued					
Egan	2,225	2,529	2,263	1,839	1,773
Erath	964	919	1,310	1,365	1,201
Garden Island	1,343	1,340	1,429	1,373	1,672
Gibson	1,020	919	910	809	853
Golden Meadows	3,784	3,452	3,032	2,649	2,500
Good Hope	1,208	1,087	1,058	859	855
Grand Bay	3,403	4,030	4,113	3,178	3,084
Gueydan	1,076	963	961	800	923
Hackberry	4,451	5,927	6,903	5,914	5,706
Horseshoe Bayou	871	836	807	722	760
Iberia		800	814	785	841
Iowa	2,465	2,214	2,006	1,743	1,553
Jeanerette	1,193	1,148	1,271	1,147	1,219
Jennings		1,024	1,247	1,301	1,439
Lafitte	3,323	2,935	3,058	2,670	3,176
Lake Arthur South		1,097	1,024	1,077	1,531
Lake Barre	1,363	1,723	2,066	2,577	4,336
Lake Chicot	1,031	1,009	954	721	783
Lake Fausse Point	1,344	1,499	1,750	1,499	1,651
Lake Pelto	2,421	2,652	2,951	3,102	4,086
Lake Salvador	1,370	1,391	1,641	1,635	2,067
Lake Washington	4,697	7,849	11,089	9,682	11,098
La Rose		1,095	1,009	1,021	1,133
Leeville	4,088	4,094	4,033	3,711	3,829
Little Lake	2,147	2,353	2,453	2,096	2,509
Lockport		908	920	768	795
Main Pass	6,354	8,417	11,064	9,672	9,581
North Crowley	1,299	1,168	1,107	924	1,008
Paradis	3,172	2,843	2,625	2,286	2,479
Phoenix Lake	1,533	1,367	1,228	1,042	1,231
Pine Prairie	885	927	826	692	577
Point-a-La Hache	2,168	1,999	1,884	915	
Port Barre	925	852	763	680	781
Quarantine Bay	3,151	3,964	3,536	2,765	2,953
Romere Pass	3,913	3,485	3,488	2,638	2,807
St. Gabriel	1,047	825	731	597	529
Section 28	1,359	1,396	1,336	1,101	1,093
Shuteston		1,025	905	979	902
South Pass		8,208	9,301	10,359	7,168
Tepetate	1,692	1,706	1,580	1,418	1,442
Timbalier Bay	3,935	6,120	8,600	8,562	10,202
University	1,073	934	822	508	446
Valentine	1,684	1,802	1,688	2,302	2,961
Venice	4,903	5,117	5,514	4,317	4,411
Ville Platte	1,249	1,150	996	794	805
Vinton	2,352	2,203	2,061	1,756	1,777
Weeks Island	8,210	8,668	8,602	6,871	7,318
West Bay	2,423	3,326	4,016	3,705	4,275
West Cote Blanche	2,016	1,891	2,022	2,989	2,967
West Lake Verret	1,332	1,361	1,333	1,259	1,245
White Castle	763	786	966	842	887
Other Gulf Coast	77,694	77,653	97,011	102,601	124,338
Total Gulf Coast	227,409	252,494	283,769	272,358	309,027
Northern:					
Big Creek	750	679	587	476	483
Caddo	9,111	8,417	7,305	7,066	6,880
Cotton Valley		1,407	945	771	823
Delhi	5,377	6,301	6,411	4,931	5,086
Esperance Point		1,684	1,621	1,415	1,337
Haynesville	3,234	2,859	2,695	3,213	3,003
Lake St. John	2,788	2,430	2,258	2,072	1,845
Nebo [2]	2,193	1,905	1,746	1,468	1,523
Olla [2]	1,709	1,626	1,432	1,432	1,583
Rodessa	793	751	710	597	683
Sligo	1,030	1,043	1,340	1,277	1,405
Urania		786	765	766	812
Other Northern	16,616	17,039	18,312	16,049	20,121
Total Northern	43,601	46,927	46,127	41,533	45,584
Total Louisiana	271,010	299,421	329,896	313,891	354,611

[1] Preliminary figures.
[2] Includes Hemphill, Trout Creek, and Jena.
[3] Includes Little Creek and Summerville.

Digitized by Google

TABLE 19.—Production of crude petroleum in Michigan, 1955–59, by fields, in thousand barrels

[Michigan Department of Conservation]

Field	1955	1956	1957	1958	1959 [1]
Beaver Creek	298	291	242	227	340
Coldwater	1,052	923	800	698	619
Deep River	1,180	875	576	286	225
East Norwich	415	402	361	332	294
Kawkawlin	400	434	595	583	496
Kimball Lake	115	57	42	22	16
Pentwater	219	197	165	135	117
Reed City and East Reed City	477	443	480	592	560
Rose City	464	392	302	292	338
St. Helen	223	209	174	142	155
Stony Lake	420	347	247	136	160
Other fields	6,003	6,170	6,185	5,863	7,118
Total Michigan	11,266	10,740	10,169	9,308	10,438

[1] Preliminary figures.

TABLE 20.—Production of crude petroleum in Mississippi, 1955–59, by fields, in thousand barrels

Field	1955	1956	1957	1958	1959 [1]
Barterville	5,301	5,874	4,939	4,993	5,843
Bolton		842	1,148	1,248	1,380
Brookhaven	3,511	3,019	2,541	2,218	1,920
Bryan					1,222
Cranfield	1,497	1,299	1,206	982	840
Diamond				959	1,040
Eucutta	1,355	1,484	1,318	1,611	1,559
Heidelberg	3,253	3,641	3,395	2,916	3,672
La Grange and South	2,128	2,137	1,936	1,649	1,714
Little Creek				1,440	5,896
Mallalieu	1,117	1,021	841	739	744
Maxie-Pistol Ridge	690	998	1,277	1,185	1,207
Raleigh					2,168
Soso	3,110	4,289	4,241	4,174	4,651
Tinsley	4,475	4,399	3,884	3,830	3,532
Yellow Creek	1,433	1,494	1,323	1,054	428
Other fields	9,871	10,327	10,873	10,514	10,112
Total Mississippi	37,741	40,824	38,922	39,512	47,928

[1] Preliminary figures.

TABLE 21.—Production of crude petroleum in Montana, 1955–59, by fields in thousand barrels

[Montana Oil Conservation Board]

Field	1955	1956	1957	1958	1959 [1]
Big Wall	300	255	248	218	204
Bowes	510	340	299	282	333
Cabin Creek	631	1,633	3,666	4,255	4,350
Cat Creek	174	162	163	170	151
Cut Bank	2,604	2,684	2,515	2,210	2,004
Elk Basin	1,441	2,007	2,603	3,143	4,065
Glendive	621	678	714	732	505
Kevin-Sunburst	1,131	1,017	953	969	833
Pine	1,115	3,667	5,326	5,346	4,832
Pondera	491	684	595	563	521
Poplar	3,185	4,098	4,894	4,641	3,775
Reagan	224	220	213	166	175
Sumatra	1,540	1,459	1,306	1,600	2,013
Other fields	1,597	2,856	3,677	3,662	6,318
Total Montana	15,654	21,760	27,172	27,957	30,079

[1] Preliminary figures.

569112—60——24

Digitized by Google

TABLE 22.—Production of crude petroleum in New Mexico, 1955–59, by districts and fields, in thousand barrels

[Oil and Gas Journal]

District and field	1955	1956	1957	1958	1959 [1]
Southeast:					
Bagley	1,659	1,614	1,471	1,312	1,188
Brunson	1,691	1,193	870	627	519
Caprock—East	2,243	6,942	6,362	5,216	6,581
Crossroad	1,193	1,358	1,307	1,402	1,426
Denton	11,031	10,778	9,391	7,968	7,141
Dollarhide—West	3,164	3,027	2,761	2,510	1,855
Drinkard	2,482	2,054	1,850	1,738	1,597
Eunice-Monument	10,544	10,527	12,817	11,674	7,896
Fowler	1,362	847	922	787	711
Gladiola	1,293	1,605	4,529	7,324	7,046
Grayburg-Jackson	1,054	945	845	1,318	1,554
Hare	1,290	973	829	583	634
Hobbs	3,397	3,401	3,495	3,248	3,399
Langlie-Mattix	1,641	2,046	1,989	1,996	2,289
Lovington—East	3,316	3,080	2,790	2,466	2,337
Maljamar	1,878	2,277	2,227	2,449	2,730
Moore	1,228	1,235	1,187	1,042	1,014
Saunders—South	1,903	1,727	1,534	1,781	2,476
Vacuum	3,804	3,944	3,724	3,348	3,709
Warren	1,508	1,473	1,007	1,604	1,194
Other fields [2]	24,260	25,433	30,333	29,571	36,151
Northwest	1,017	1,414	2,519	8,551	12,245
Total New Mexico	82,958	87,893	94,759	98,515	105,692

[1] Preliminary figures. [2] Bureau of Mines figures.

TABLE 23.—Production of crude petroleum in Oklahoma, 1955–59, by fields, in thousand barrels

[Oil and Gas Journal]

Field	1955	1956	1957	1958	1959 [1]
Allen	1,733	1,638	1,608	1,590	1,676
Beebe	836	745	707	625	606
Bradley	2,170	3,169	3,053	2,741	2,898
Burbank	10,139	13,519	14,280	14,548	14,463
Cache Creek	707	661	721	827	910
Cement	4,186	4,372	4,061	4,405	4,222
Cumberland	1,841	1,944	1,812	1,474	1,407
Cushing	2,823	2,549	2,650	2,702	2,585
Davenport	1,133	1,338	1,289	959	855
Dilworth	1,135	921	677	517	453
Doyle	2,683	3,056	2,798	2,421	2,241
Elk City	6,277	5,326	4,078	2,806	2,113
Eola	2,193	3,566	3,896	3,188	3,863
Fitts	872	785	723	800	910
Garber	692	862	849	826	876
Glennpool	1,983	1,901	2,259	2,773	3,164
Golden Trend	[3]	20,204	17,245	13,106	10,627
Healdton	2,307	2,347	2,260	2,331	2,256
Hewitt	3,411	3,495	3,240	3,084	2,977
Holdenville—East	1,476	1,117	628	476	412
Hoover—Northwest	1,662	2,063	1,863	2,417	2,039
Knox	1,143	1,291	1,232	1,045	941
Loco	1,370	1,606	1,542	1,372	1,290
Lucien	797	951	817	743	749
Moore—West			3,250	2,553	1,527
Naval Reserve	1,022	1,102	1,409	1,498	1,667
Oklahoma City	3,803	3,743	3,482	3,290	3,050
Olympic	2,662	1,752	1,573	1,341	1,101
Payson—East	918	786	467	[2]	423
Ringwood	551	484	[2]	[2]	[2]
Seminole:					
Bowlegs	718	685	655	619	665
Little River	699	571	478	430	390
St. Louis	1,672	1,486	1,443	1,410	1,379
Seminole	921	827	912	876	797
Sho-Vel-Tum	30,316	29,717	29,008	25,823	25,175
West Edmond	1,733	1,945	1,292	1,153	1,013
Witcher	439	378	[2]	[2]	[2]
Yale-Quay	1,479	1,322	1,765	1,927	1,700
Other Fields [3]	102,315	91,638	94,649	92,003	93,067
Total Oklahoma	202,817	215,862	214,661	200,699	196,457

[1] Preliminary figures. [2] Included in "Other fields." [3] Bureau of Mines figures.

Digitized by Google

TABLE 24.—Production of crude petroleum in Texas, 1955–59, by districts and fields

(Thousand barrels)

Districts and fields [1]	1955	1956	1957	1958	1959 [2]
Gulf Coast:					
Amelia	1,122	1,091	(3)	(3)	(3)
Anahuac	5,279	5,165	5,279	4,028	4,096
Barbers Hill	1,959	1,865	1,662	1,585	1,385
Beaumont—West	954	900	(3)	(3)	(3)
Bloomington	1,332	1,276	1,130	866	853
Boling	1,698	1,616	1,433	1,395	1,341
Chocolate Bayou	4,605	4,118	4,361	4,200	3,953
Conroe	10,376	10,455	9,492	6,979	6,958
Damond Mound	1,098	907	(3)	(3)	(3)
Dickenson-Gillock	3,987	3,946	3,571	3,222	2,967
Dyersdale	841	688	(3)	(3)	(3)
Esperson	1,154	1,023	1,005	1,037	976
Fairbanks	1,427	1,254	1,054	894	700
Falls City	904	854	(3)	(3)	(3)
Fannette	1,252	1,185	1,511	1,760	1,578
Francitas	1,556	1,540	1,272	846	815
Friendswood	10,620	10,515	9,511	6,760	6,865
Gohlke, Helen	2,305	2,081	1,715	1,244	1,246
Goose Creek	3,007	2,813	2,736	2,617	2,541
Greta	2,398	2,371	2,221	1,668	1,905
Hankamer	1,253	1,118	1,023	1,034	1,064
Hastings	11,649	11,396	10,304	7,919	9,318
Heyser	1,087	1,001	(3)	(3)	(3)
High Island	3,143	3,476	3,554	3,864	3,958
Houston—North and South	1,341	1,285	1,227	1,045	950
Hull	4,040	3,909	3,668	3,653	3,222
Humble	1,185	1,057	1,074	1,065	1,151
Liberty, South	2,677	3,324	4,100	5,657	4,565
Livingston	1,152	1,059	(3)	(3)	(3)
Lolita	1,358	1,459	1,378	1,407	1,703
Lovells Lake	860	870	(4)		751
McFaddin	1,316	1,314	1,138	796	477
Manvel	1,709	1,649	1,469	1,069	1,099
Markham	1,422	1,598	1,819	1,957	1,701
O'Connor, Tom					7,049
Old Ocean	5,378	5,287	5,674	4,707	4,471
Oyster Bayou	3,080	2,968	2,612	2,044	2,148
Pierce Junction	1,213	5,395	6,720	5,007	3,846
Placedo	1,832	1,716	1,371	1,057	910
Port Neches	1,491	1,260	1,002	921	881
Raccoon Bend	2,082	2,084	1,694	1,321	1,348
Refugio-Fox	2,422	2,190	2,055	1,923	1,824
Saratoga	1,968	1,112	1,618	1,431	1,119
Silsbee	1,340	1,284	937	1,221	2,047
Sour Lake	1,459	1,408	1,319	1,194	1,151
Stowell	1,709	1,738	1,198	603	615
Sugarland	959	932	853	608	616
Sugar Valley	1,135	1,101	921	715	695
Thompson	8,944	8,990	8,193	6,000	5,979
Tomball	2,188	2,242	2,035	1,498	1,619
Village Mills	2,519	2,511	2,730	2,063	2,137
West Columbia	2,436	2,365	2,475	2,687	2,934
West Ranch	5,606	6,314	6,190	4,641	4,713
Withers-Magnet	3,273	3,241	3,162	2,458	2,230
Other Gulf Coast	78,202	81,254	77,995	68,720	66,530
Total Gulf Coast	221,302	225,570	209,461	179,386	183,000
East Texas:					
East Texas Proper	80,279	77,582	70,109	52,593	53,691
Cayuga	1,078	1,088	999	925	937
Ham Gossett	1,067	871	659	486	462
Hawkins	16,865	16,304	14,786	10,687	10,796
Long Lake	988	1,161	1,779	645	681
New Hope	2,510	2,172	2,162	1,993	1,933
Pewitt Ranch	1,117	1,073	927	700	661
Pickton	1,453	1,429	1,189	983	808
Quitman	2,190	2,176	2,192	2,117	2,478
Talco	4,994	4,896	4,523	3,977	4,280
Van	8,816	8,703	7,823	5,683	5,700
Waskom	1,118	1,191	872	889	902
Woodlawn	919	652	419	380	384
Other East Texas	22,256	21,954	21,919	24,242	24,008
Total East Texas	145,650	141,252	130,358	106,300	107,721

See footnotes at end of table.

Digitized by Google

TABLE 24.—Production of crude petroleum in Texas, 1955–59, by districts and fields—Continued

(Thousand barrels)

Districts and fields [1]	1955	1956	1957	1958	1959 [2]
Central Texas:					
Big Foot	2,455	2,148	1,610	2,021	1,686
Charlotte	2,152	2,960	2,071	1,541	1,474
Darst Creek	3,487	3,415	3,450	3,465	3,331
Luling	2,555	2,699	2,598	2,444	1,832
Other Central Texas	7,648	9,225	8,727	6,916	8,380
Total Central Texas	18,297	20,447	18,456	16,387	16,703
South Texas:					
Aqua Dulce	1,389	1,428	1,479	1,171	1,038
Flour Bluff	900	829	872	750	(3)
Fulton Beach	2,701	2,579	4,340	2,415	2,051
Garcia	1,008	931	834	645	(3)
Hoffman	1,500	1,385	1,440	1,210	1,384
Kelsey	3,609	3,833	3,359	2,457	2,568
London	1,101	1,238	1,083	728	(3)
Midway	1,070	1,090	940	644	(3)
Mirando					4,335
Mustang Island	2,768	2,566	2,246	1,755	2,207
Plymouth	6,740	6,043	4,757	3,992	6,157
Portilla	3,719	3,144	2,936	2,228	(3)
Saxet-Saxet Frio	757	1,173	1,312	847	790
Seeligson					8,838
Stratton	2,401	2,345	1,999	1,500	1,746
Sun	1,360	1,843	1,673	1,439	1,644
Taft	1,353	1,251	929	744	899
White Point	3,260	3,444	3,426	2,417	2,275
Willamar, West	2,480	2,442	2,072	1,491	1,512
Other South Texas	52,130	52,930	47,002	43,057	36,251
Total South Texas	90,246	90,494	82,699	69,490	73,695
North Texas	129,701	138,696	132,457	120,176	124,261
Panhandle	33,400	36,682	38,481	38,587	39,386
West Texas:					
Abell	1,497	1,520	1,590	1,465	1,366
Adair	2,487	2,392	2,107	1,552	1,915
Andector	5,692	5,510	4,500	2,719	2,815
Anton Irish-Anton	2,930	2,933	2,600	2,000	2,068
Benedum	2,645	2,225	1,982	1,657	1,520
Big Lake	921	801	(3)	(3)	(3)
Block 31	5,191	5,727	5,690	5,695	5,786
Bronte	1,107	932	1,865	1,261	1,252
Cedar Lake	1,614	1,464	1,385	1,061	1,088
Cogdell	6,507	6,848	6,908	4,972	6,188
Cowden	10,009	10,769	9,764	9,178	10,460
Cree-Sykes	1,230	1,079	1,241	761	807
Diamond M	9,300	9,381	8,465	5,779	5,903
Dollarhide	5,944	4,959	4,139	3,227	3,218
Elkhorn	1,216	900	(3)	(3)	(3)
Embar	1,259	1,704	1,862	1,522	1,702
Emma	2,118	3,259	3,452	2,621	3,033
Fort Chadborne	4,516	3,802	3,788	3,806	3,369
Fort Stockton	1,294	1,525	1,272	976	1,084
Foster	4,616	4,816	4,282	3,388	3,049
Fuhrman	2,655	3,662	4,471	3,878	3,969
Fullerton	6,973	6,495	5,977	5,700	6,087
Garza	2,628	2,815	2,625	2,104	2,040
Goldsmith	16,212	18,385	20,434	20,827	23,890

See footnotes at end of table.

Digitized by Google

TABLE 24.—Production of crude petroleum in Texas, 1955–59, by districts and fields—Continued

(Thousand barrels)

Districts and fields [1]	1955	1956	1957	1958	1959 [2]
West Texas—Continued					
Good	1,448	1,383	1,248	1,022	1,381
Harper	1,477	2,217	2,424	1,999	1,927
Hendrick	1,307	1,263	1,351	1,522	1,625
Howard-Glasscock	7,364	6,905	6,683	6,865	6,310
Hulldale Penn	1,824	2,104	1,763	1,278	1,340
Iatan—East and North					1,834
Jameson	7,694	6,905	4,822	3,360	2,971
Jordan	3,481	3,316	3,378	3,007	2,934
Kelly Snyder	22,308	25,339	26,827	19,568	21,072
Kermit	2,834	3,704	4,841	4,510	5,231
Keystone	8,848	7,801	7,005	6,214	5,962
Lea	1,363	1,506	1,359	1,047	963
Levelland	9,504	8,714	7,892	6,584	6,427
Luther	1,136	1,246	1,073	900	910
McCamey	2,003	1,730	1,881	1,947	1,885
McElroy	6,829	9,562	10,751	9,220	9,249
McFarland	[4]	2,050	3,708	5,954	2,134
Mabee	1,016	1,024	1,093	1,112	1,636
Magutex	1,997	2,232	2,132	1,604	2,223
Martin	2,052	2,199	2,067	1,515	1,456
Means	2,996	6,421	6,495	5,058	4,803
Midland Farms	6,997	7,638	7,143	5,993	6,746
Pegasus	5,481	5,165	4,490	3,342	3,984
Penwell	1,612	1,719	2,049	2,245	2,679
Prentice	5,529	5,753	5,164	4,322	4,284
Reinecke	1,572	1,525	1,401	1,008	1,014
Robertson	[4]	1,344	1,652	2,143	3,033
Russell	5,541	7,200	6,874	5,137	5,206
Salt Creek	4,180	4,039	3,679	2,840	3,952
Sand Hills	5,074	6,800	6,729	5,334	5,294
Seminole	5,547	5,584	5,246	3,836	3,802
Shafter Lake	3,799	3,444	3,019	2,375	2,487
Sharon Ridge	1,348	1,590	1,966	2,500	3,857
Slaughter	11,151	11,010	10,180	8,237	8,712
Spraberry Trend	22,155	24,010	19,835	15,021	12,738
Three Bar	1,214	1,189	1,036	758	858
Tippett	[3]	[3]	[3]	[3]	1,684
Todd	2,502	2,435	1,939	1,298	1,462
Triple N	1,254	1,492	1,342	1,406	1,626
TXL	6,146	5,602	5,502	4,449	4,425
University	2,163	3,704	4,122	3,419	3,682
Vealmoor—East	3,440	3,248	2,903	2,088	2,072
Waddell	1,349	1,572	2,635	2,903	2,526
Ward-Estes	8,713	9,964	14,245	17,561	19,544
Wasson	15,752	15,617	14,377	11,566	12,830
Welch	1,392	1,835	1,858	1,616	2,087
Wellman	1,163	1,057	[3]	[3]	[3]
Westbrook	[4]	1,209	1,869	1,577	1,597
Wilshire	2,953	2,174	1,949	1,405	1,390
World	1,441	1,903	1,814	1,734	1,800
Yarbrough	2,202	2,141	1,900	1,372	1,294
Yates	9,878	9,681	8,818	6,396	6,343
Other West Texas	85,111	101,499	117,027	115,524	129,184
Total West Texas	414,701	454,667	461,955	409,840	439,074
Total Texas	1,053,297	1,107,808	1,073,867	940,166	983,840

[1] Texas Railroad Commission districts.
[2] Preliminary figures.
[3] Included in "Other" fields.
[4] Not available.

Digitized by Google

TABLE 25.—Production of crude petroleum in Wyoming, 1955–59, by fields

(Thousand barrels)

Field	1955	1956	1957	1958	1959 [1]
Bairoil					6,135
Beaver Creek	1,130	2,436	2,289	2,391	2,369
Big Muddy	1,232	2,120	1,915	1,781	2,260
Big Sand Draw	2,546	2,543	2,648	2,586	2,489
Bonanza	5,033	5,581	5,075	4,801	3,497
Byron-Garland	7,599	7,916	6,978	6,474	7,820
Cole Creek—Northeast and South	1,223	1,094	985	879	746
Elk Basin	7,543	11,200	12,716	15,518	18,214
Fiddler Creek	(2)	(2)	(2)	(2)	3,525
Frannie	3,523	3,055	2,695	2,647	2,812
Gebo	1,469	1,342	1,165	1,067	1,163
Glenrock-South	3,660	3,488	3,091	2,711	2,509
Grass Creek	4,155	4,308	4,000	3,899	4,619
Hamilton Dome	4,681	5,106	5,617	8,577	9,294
Hidden Dome	(2)	(2)	(2)	(2)	2,867
Lance Creek	1,484	1,489	1,539	1,338	1,222
Little Buffalo	1,228	1,187	1,250	2,105	2,250
Lost Soldier	6,449	6,506	6,513	6,407	
Oregon Basin	5,888	5,817	5,168	4,719	5,193
Salt Creek	4,423	5,085	6,796	8,486	7,500
Steamboat Butte	3,470	3,419	3,493	3,259	(2)
Sussex-Meadow	7,392	7,602	6,728	5,564	6,955
Winkleman	1,349	1,777	2,644	3,044	3,353
Other fields	24,006	21,759	26,279	27,319	29,166
Total Wyoming	99,483	104,830	109,584	115,572	125,968

[1] Preliminary figures.
[2] Included in "Other fields."

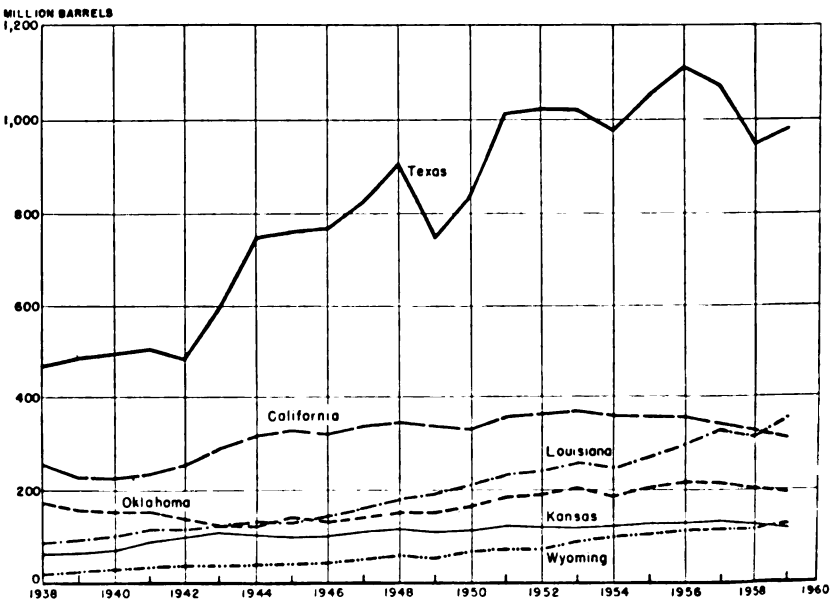

FIGURE 2.—Production of crude petroleum in the United States, 1938–59, by principal producing States.

WELLS

The number of wells drilled in the United States, including oil, condensate, gas wells, and dry holes but excluding service wells, totaled 49,496—a 3.6-percent gain over 1958. The proportion of dry

Digitized by Google

holes drilled to the total decreased from 39.4 percent in 1958 to 38.6 percent in 1959. Increased drilling activity in 1959 was noted in all but five States, whereas in 1958 only five States showed increased drilling.

At the yearend, 583,141 oil wells were reported as producing an average of 12.2 barrels per day, compared with 574,905 on December 31, 1958, producing an average of 11.7 barrels per day.

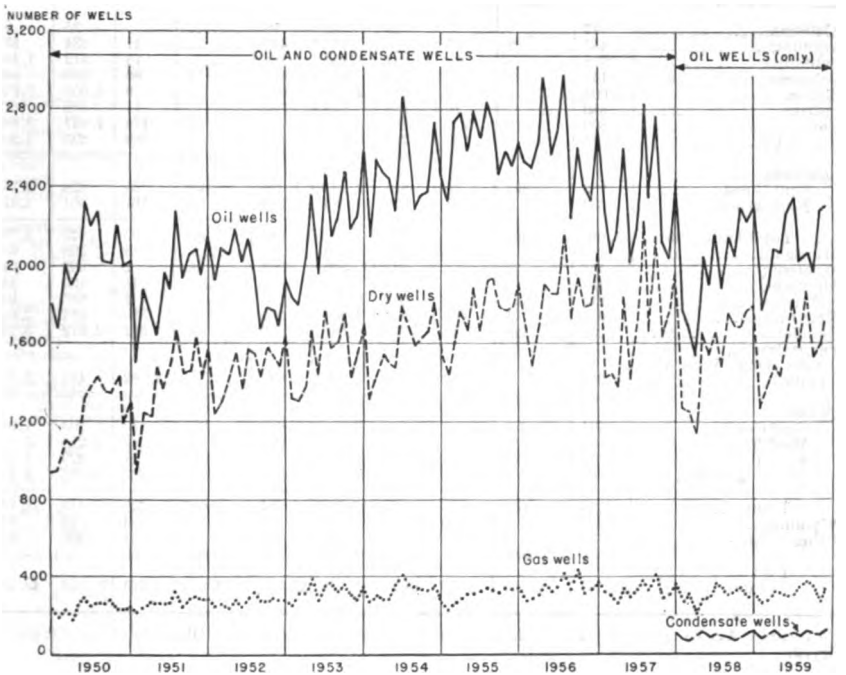

FIGURE 3.—Wells drilled for oil and gas in the United States, 1950–59, by months.

TABLE 26.—Wells drilled for oil and gas in the United States,[1] 1958–59, by months

[Oil and Gas Journal]

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	
													Number	Percent
1958														
Oil	2,456	1,773	1,690	1,528	2,042	1,896	2,150	1,874	2,148	2,053	2,299	2,228	24,137	50.5
Condensate	116	78	71	96	118	84	101	100	96	67	88	110	1,125	2.4
Gas	362	269	309	206	279	281	364	343	302	326	343	290	3,674	7.7
Dry	1,967	1,257	1,255	1,134	1,655	1,543	1,655	1,483	1,755	1,683	1,683	1,762	18,822	39.4
Total	4,891	3,377	3,325	2,964	4,094	3,804	4,270	3,800	4,301	4,129	4,413	4,390	47,758	100.0
1959														
Oil	2,303	1,772	1,895	2,088	2,069	2,272	2,338	2,020	2,067	1,973	2,275	2,307	25,379	51.3
Condensate	124	81	100	121	80	96	109	94	122	103	102	123	1,255	2.5
Gas	314	265	276	311	310	297	304	340	372	353	277	342	3,761	7.6
Dry	1,801	1,272	1,392	1,485	1,441	1,581	1,819	1,597	1,868	1,530	1,600	1,715	19,101	38.6
Total	4,542	3,390	3,663	4,005	3,900	4,246	4,570	4,051	4,429	3,959	4,254	4,487	49,496	100.0

[1] Includes Alaska as follows: 1958: Oil, 0; condensate, 0; gas, 0; dry, 4 ;1959: Oil, 5; condensate, 0; gas, 3; dry, 9.

Digitized by Google

TABLE 27.—Wells drilled for oil and gas in the United States, 1958–59, by States and districts

[Oil and Gas Journal]

State and district	1958					1959				
	Oil	Condensate	Gas	Dry	Total	Oil	Condensate	Gas	Dry	Total
Alabama	47			29	76	70			25	95
Arkansas	455	3	37	338	833	462		41	334	837
California	918		39	498	1,455	884		73	512	1,469
Colorado	149	2	80	605	836	160	2	83	560	805
Illinois	1,003		49	1,272	2,324	1,009		9	1,062	2,080
Indiana	310		16	546	872	295		11	566	872
Kansas	1,809	9	228	1,858	3,904	1,760	9	174	1,937	3,880
Kentucky	1,224		139	767	2,130	2,146		289	893	3,328
Louisiana:										
Gulf Coast	980	302	36	813	2,131	1,034	358	35	824	2,251
Northern	636		178	570	1,384	752	3	161	601	1,517
Total Louisiana	1,616	302	214	1,383	3,515	1,786	361	196	1,425	3,768
Michigan	159		27	218	404	241		54	308	603
Mississippi	157	22	2	217	398	251	30	2	362	645
Montana	159	1	6	171	337	168		11	169	348
Nebraska	215			513	728	293		1	616	910
New Mexico	1,012	21	491	380	1,904	1,239	52	359	414	2,064
Oklahoma	3,251	122	340	2,336	6,049	2,677	106	392	2,072	5,247
Pennsylvania, New York, Ohio, West Virginia	1,065		1,057	473	2,595	881		1,182	492	2,555
Texas:										
Gulf Coast	705	232	137	958	2,032	682	270	133	903	1,988
West Texas	3,937	57	54	1,031	5,079	4,035	60	68	1,216	5,379
East Texas	617	92	3	506	1,218	715	87	11	429	1,242
Other districts	4,500	261	661	3,970	9,392	4,772	270	567	3,905	9,514
Texas	9,759	642	855	6,465	17,721	10,204	687	779	6,453	18,123
Wyoming	316		66	379	761	371	3	74	501	949
Other States [1]	513	1	28	374	916	482	5	31	400	918
Total United States	24,137	1,125	3,674	18,822	47,758	25,379	1,255	3,761	19,101	49,496

[1] Includes Alaska as follows: 1958: Oil, 0; condensate, 0; gas, 0; dry, 4; 1959: Oil, 5; condensate 0; gas, 3; dry, 9.

Digitized by Google

TABLE 28.—Producing oil wells in the United States and average production per well per day, 1958–59, by States

State and district	Producing oil wells			
	1958		1959 [1]	
	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels) [2]	Approximate number of producing oil wells, Dec. 31	Average production per well per day (barrels) [2]
Arkansas	5,715	13.8	6,155	12.2
California	36,285	23.4	36,915	23.0
Colorado	2,195	61.0	2,089	59.0
Illinois	31,775	6.9	31,826	6.8
Indiana	4,865	6.8	5,050	6.6
Kansas	37,880	8.6	40,175	8.4
Kentucky	18,965	2.6	21,165	3.6
Louisiana:				
Gulf Coast	10,820	70.8	11,110	77.2
Northern	12,250	9.3	12,358	10.2
Total Louisiana	23,070	38.1	23,468	41.8
Michigan	3,895	6.4	4,130	7.1
Mississippi	2,240	47.5	2,403	56.6
Montana	3,916	19.9	3,888	21.1
Nebraska	1,190	50.3	1,461	48.9
New Mexico:				
Southeastern	11,065	22.7	11,540	22.0
Northwestern	980	31.6	1,200	37.5
Total New Mexico	12,045	23.6	12,740	23.4
New York	19,530	.2	19,230	.3
North Dakota	1,150	39.9	1,390	38.7
Ohio	15,200	1.2	16,934	.9
Oklahoma	75,210	7.3	75,630	7.1
Pennsylvania	68,485	.3	68,450	.2
Texas: [3]				
Gulf Coast	24,495	20.5	18,818	23.2
East Texas proper	20,865	6.9	18,904	7.4
West Texas	60,395	18.6	60,730	19.9
Other districts	84,205	9.7	90,482	9.7
Total Texas	189,960	13.6	188,934	14.2
Utah	519	182.7	697	180.7
West Virginia	12,815	.5	12,780	.5
Wyoming	7,530	42.4	7,090	47.2
Other States	470	42.0	[4] 541	31.6
Total United States	574,905	11.7	583,141	12.2

[1] Preliminary figures.
[2] Based on the average number of wells during the year.
[3] Divisions of the Texas Railroad Commission.
[4] Alabama, 344 wells; Alaska, 5; Arizona, 2; Florida, 11; Missouri, 121; Nevada, 2; South Dakota, 14; Tennessee, 34; Virginia, 7; Washington, 1.

Digitized by Google

TABLE 29.—Runs to stills of crude petroleum in the United States in 1959, by district and month [1]

(Thousand barrels)

District [2]	January	February	March	April	May	June	July	August	September	October	November	December	Total
East Coast:													
Domestic	17,474	17,177	18,765	17,723	12,310	10,271	12,594	16,188	12,506	12,023	13,135	14,368	174,534
Foreign	19,566	17,069	18,503	15,689	19,120	21,727	21,534	19,467	19,446	20,552	21,081	20,330	234,084
Total East Coast	37,040	34,246	37,268	33,412	31,430	31,998	34,128	35,655	31,952	32,575	34,216	34,698	408,618
Appalachian No. 1	3,012	2,826	3,211	2,522	2,787	3,124	2,854	2,875	2,914	2,834	2,791	3,227	34,977
Appalachian No. 2	3,534	3,226	3,191	2,724	2,689	3,284	3,313	3,240	2,871	3,213	2,754	3,401	37,440
Indiana, Illinois, Kentucky, etc.:													
Domestic	46,416	41,738	46,935	42,456	44,233	44,594	43,641	44,372	43,055	43,867	43,693	47,781	532,781
Foreign	464	402	145	165	318	308	164	158	166	196	229	211	2,926
Total Indiana, Illinois, Kentucky, etc	46,880	42,140	47,080	42,621	44,551	44,902	43,805	44,530	43,221	44,063	43,922	47,992	535,707
Minnesota, Wisconsin, North Dakota and South Dakota:													
Domestic	1,520	1,435	1,418	1,525	1,670	1,749	1,920	1,857	1,833	746	1,837	1,872	19,382
Foreign	1,827	1,480	1,782	1,237	1,513	1,673	1,639	1,311	1,272	1,454	1,560	1,892	18,640
Total Minnesota, Wisconsin, North Dakota, and South Dakota	3,347	2,915	3,200	2,762	3,183	3,422	3,559	3,168	3,105	2,200	3,397	3,764	38,022
Oklahoma, Kansas, etc	23,871	21,772	22,886	20,937	22,112	22,783	21,969	22,294	22,122	21,340	20,844	21,656	264,586
Texas Inland	8,622	8,115	8,443	7,815	8,757	8,743	9,122	9,471	8,292	8,885	8,735	9,012	104,012
Texas Gulf Coast:													
Domestic	59,121	48,204	58,099	56,573	61,228	52,662	53,073	56,983	53,628	53,059	54,651	57,991	665,272
Foreign	1,658	1,503	1,628	533	500	967	774	145	218	208	142	198	8,474
Total Texas Gulf Coast	60,779	49,707	59,727	57,106	61,728	53,629	53,847	57,128	53,846	53,267	54,793	58,189	673,746
Louisiana Gulf Coast:													
Domestic	21,452	19,884	21,554	20,625	21,508	21,430	21,881	22,115	21,068	21,451	21,375	22,117	256,460
Foreign	210	173	154	34	52	156	206	99	115	23	27	5	1,254
Total Louisiana Gulf Coast	21,662	20,057	21,708	20,659	21,560	21,586	22,087	22,214	21,183	21,474	21,402	22,122	257,714
Arkansas, Louisiana Inland, etc	2,858	2,961	3,166	3,180	3,201	2,830	2,144	2,082	2,176	2,088	2,260	3,145	32,091
New Mexico	751	701	756	641	536	712	822	838	702	839	790	716	8,804

Digitized by Google

Rocky Mountain:													
Domestic	8,886	8,204	9,155	7,520	7,571	9,105	10,130	9,861	9,153	8,579	8,771	9,088	106,023
Foreign					1	1	6	2	2	1	1	1	15
Total Rocky Mountain	8,886	8,204	9,155	7,520	7,572	9,106	10,136	9,863	9,155	8,580	8,772	9,089	106,038
West Coast:													
Domestic	27,303	24,871	27,974	27,839	29,055	26,815	28,892	28,488	27,049	27,816	26,482	26,558	329,142
Foreign	6,579	5,821	6,657	6,244	5,628	6,673	7,638	8,662	7,738	7,892	8,359	8,873	86,764
Total West Coast	33,882	30,692	34,631	34,083	34,683	33,488	36,530	37,150	34,787	35,708	34,841	35,431	415,906
Total United States:													
Domestic	224,820	201,114	225,553	212,080	217,657	208,102	212,355	220,664	207,369	206,740	208,118	220,932	2,565,504
Foreign	30,304	26,448	28,869	23,902	27,132	31,505	31,961	29,844	28,957	30,326	31,399	31,510	352,157
Grand total: 1959	255,124	227,562	254,422	235,982	244,789	239,607	244,316	250,508	236,326	237,066	239,517	252,442	2,917,661
1958	239,376	211,966	229,240	217,138	230,907	226,977	235,396	243,548	233,601	239,449	234,156	247,650	2,789,404
Daily average, 1959	8,230	8,127	8,207	7,866	7,896	7,987	7,881	8,081	7,878	7,647	7,984	8,143	7,994

[1] Preliminary figures.

[2] Where no breakdown in shown, runs were all of domestic crude.

Digitized by Google

CONSUMPTION AND DISTRIBUTION

The total demand for crude oil in the United States was 8,034,300 barrels daily—4.1 percent higher than 1958. The demand for domestic crude oil increased 4.5 percent and the demand for foreign crude oil 1.3 percent.

Foreign crude oil supplied 12.1 percent of the total demand in 1959 compared with 12.4 percent in 1958.

Exports of crude oil continued to decline in 1959 and totaled only 2,500,000 barrels for the year.

Runs to Stills.—Total crude runs to stills averaged 7,994,000 barrels daily in 1959—a 4.6 percent increase for the year.

Distribution.—The Bureau of Mines collects data on receipts of domestic and foreign crude petroleum at refineries in the United States. These receipts include crude runs to stills, a small quantity used as refinery fuel, and any increase in crude stocks at refineries. Classification of receipts, by State of origin, shows receipts from local production (intrastate), receipts from other States (interstate), and receipts of imported crude. Classification by method of transportation indicates the final receipts by water, pipeline, and tank car and truck. Receipts of domestic crude by water usually were moved by pipeline from the point of production to the point of water shipment.

Receipts of domestic and foreign crude petroleum at refineries totaled 2,919.3 million barrels in 1959, of which foreign crude represented 12 percent. Refineries processed 2,917.7 million barrels and reported 1.9 million barrels used for refinery fuel or counted as losses. The difference of 0.3 million barrels was withdrawn from stocks.

Refineries received 74.8 percent of their supply of crude oil by pipeline, 23.8 percent by water, and the balance by tank cars and trucks.

The major waterborne shipments were from the Gulf Coast to the East Coast and between States in the Gulf Coast districts. Interstate and intrastate shipments also were made by water on the West Coast and the Mississippi River.

Digitized by Google

All foreign crude receipts into the East Coast and the Gulf Coast districts are received by water. Refineries in District 2, which comprises the Great Lakes and the midcontinent areas, receive most of their foreign crude by pipeline from Canada; however, some is barged up river from Gulf Coast ports where it arrived by tanker. Very little foreign crude is processed at refineries in the Rocky Mountain States; that used arrives at the refineries by rail from Canada. West Coast refiners received 84.9 percent of their foreign crude by water; the balance is received by pipeline at refineries near the Canadian border.

Demand by States of Origin.—Distribution of domestic crude oil by refining States and districts can be analyzed from receipts of crude oil at refineries. When long-distance shipments are involved, various crudes may be mixed in transit or storage, and identification by origin may be only approximate.

TABLE 30.—Receipts of domestic and foreign crude petroleum at refineries in the United States, 1955–59

(Million barrels)

Method of transportation	1955	1956	1957	1958	1959 [1]
By water:					
Intrastate	155.4	166.4	152.2	141.4	134.1
Interstate	202.9	220.6	253.7	233.7	242.7
Foreign	268.6	304.5	318.0	313.4	316.8
Total by water	626.9	691.5	723.9	688.5	693.6
By pipeline:					
Intrastate	1,278.1	1,329.1	1,296.7	1,208.3	1,282.8
Interstate	772.0	819.3	790.6	808.3	868.5
Foreign	16.8	37.3	47.8	30.4	33.4
Total by pipeline	2,066.9	2,185.7	2,135.1	2,047.0	2,184.7
By tank cars and truck:					
Intrastate	28.9	28.9	31.9	27.6	31.8
Interstate	9.2	6.0	8.0	9.2	9.2
Foreign			0.1		
Total by tank cars and trucks	38.1	34.9	40.0	36.8	41.0
Grand total	2,731.9	2,912.1	2,899.0	2,772.3	2,919.3

[1] Preliminary figures.

Digitized by Google

TABLE 31.—Refinery receipts of domestic crude oil by States and districts, 1959

(Thousand barrels)

Receiving State and district	Total domestic receipts	Intrastate receipts	Interstate receipts from—																	
			Ala. and Miss.	Ark.	Calif., Nev., and Alaska	Colo.	Fla. and N.Y.	Ill.	Ind.	Kans.	Ky. and Ohio	La.	Mont.	Nebr., N. Dak., and S. Dak.	N. Mex.	Okla.	Texas	Utah	W. Va.	Wyo.	Total
Delaware, Massachusetts, Rhode Island	30,051		1,202		1,782							11,212					15,855				30,051
Florida, Georgia, South Carolina, Virginia	1,850		1,389		305												156				1,850
Maryland	791		327		464																791
New Jersey	56,948		3,828		889		225					12,867			126		39,013				56,948
New York:																					
East																					
West	18,247							4,098		334			1,316			3,909	8,590				18,247
Pennsylvania:																					
East	85,904		3,910									16,652					65,342				85,904
West	14,198	8,616					249	1,203			668		971	137		415	1,707		232		5,582
West Virginia	2,474	1,537									937										937
Total, District 1	210,463	10,153	10,656		3,440		474	5,301		334	1,605	40,731	2,287	137	126	4,324	130,663		232		200,310
Illinois	191,327	23,682				1,201			1,618	11,523			211	1,997	4,722	29,368	98,729	6,638		11,638	167,645
Indiana	156,185	1,370				3,245		6,447		23,684	25		5,838	4,533	4,802	33,675	34,004			38,562	154,815
Kansas	109,287	86,173				3,384								1,366	5,014	9,762	2,857			731	23,114
Kentucky, Tennessee	37,942	25,291	2,231	99				213	5,674		3	2,861					1,570				12,651
Michigan	48,791	10,180				242		5,986	14	898			3,046	753		933	11,716			15,023	38,611
Minnesota, Wisconsin	5,475												387	3,252						1,836	5,475
Missouri	20,142									26					10,305	691	7,406			1,714	20,142
Nebraska	902																			902	902
North Dakota	14,067	14,067																			
Ohio:																					
East	37,383	3,908	2,075	1,039				26,193		337	495					2,148	943			245	33,475
West	99,589	316	235	2,234	529	2,496		12,243			2,479	16,126		3,326	1,493	10,161	46,558			1,393	99,273
Oklahoma	134,799	93,747				1,044				10,446				649	712		22,335	5,866			41,052
Total, District 2	855,889	258,734	4,541	3,372	529	11,612		51,082	7,306	46,914	3,002	18,987	9,482	15,876	27,048	86,738	226,118	12,504		72,044	597,155

Digitized by Google

Alabama, Mississippi	9,818	6,986	2,136	------	377	------	------	------	------	------	------	319	------	------	------	------	------	------	------	------	2,832
Arkansas	21,726	20,839	------	------	------	------	------	------	------	------	------	887	------	------	------	------	------	------	------	------	887
Louisiana	256,888	184,721	31,695	9,641	------	------	------	------	------	------	------	------	------	------	------	32	30,364	435	------	------	72,167
New Mexico	8,828	8,828	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Texas	769,029	605,258	1,062	------	------	------	------	------	------	------	------	98,875	------	------	56,847	3,460	------	3,527	------	------	163,771
Total, District 3	1,066,289	826,632	34,893	9,641	377	------	------	------	------	------	------	100,081	------	------	56,847	3,492	30,364	3,962	------	------	239,657
Colorado	12,124	1,025	------	------	------	------	------	------	------	------	------	------	1,867	------	86	------	------	------	------	9,146	11,099
Montana	26,175	9,123	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	17,052	17,052
Utah	30,459	4,803	------	------	------	21,592	------	------	------	------	------	------	------	------	171	------	------	------	------	3,893	25,656
Wyoming	37,481	35,075	------	------	------	2,249	------	------	------	------	------	------	------	157	------	------	------	------	------	------	2,406
Total, District 4	106,239	50,026	------	------	------	23,841	------	------	------	------	------	------	1,867	157	257	------	------	------	------	30,091	56,213
California	322,934	303,227	------	------	159	------	------	------	------	------	------	------	------	------	7,387	------	------	12,161	------	------	19,707
Washington, Oregon	7,314	1	------	------	3,399	------	------	------	------	------	------	------	------	------	3,178	------	------	736	------	------	7,313
Total, District 5	330,248	303,228	------	------	3,558	------	------	------	------	------	------	------	------	------	10,565	------	------	12,897	------	------	27,020
Total, 1959	2,569,128	1,448,773	50,090	13,013	7,904	35,453	474	56,383	7,306	47,248	4,607	159,799	13,636	16,170	94,843	94,554	387,145	29,363	232	102,135	1,120,355
Daily average, 1959	7,039	3,969	137	36	22	97	1	155	20	129	13	438	37	44	260	259	1,061	80	1	280	3,070
Daily average, 1958	6,654	3,774	110	38	21	99	1	144	30	144	10	354	39	39	241	243	1,052	48	2	265	2,880

Digitized by Google

TABLE 32.—Crude runs to stills and refinery receipts of crude oil by origin of the crude and method of transportation by States and districts, 1959

(Thousand barrels)

Receiving State and district	Crude runs to stills	Refinery fuel use and losses	Refinery receipts of domestic crude							Refinery receipts of foreign crude
			By State of origin of domestic crude	Change in refinery stocks	By receiving State and method of transportation					
					Intrastate			Interstate		
					Pipelines	Tank cars and trucks	Boats and barges	Pipelines	Tank cars and trucks	Boats and barges
Delaware, Massachusetts, Rhode Island	53,556	141		+169						30,051	23,815
Florida, Georgia, South Carolina, Virginia	16,025	−5	225	+276					399	1,451	14,446
Maryland	5,369	−14		+36						791	4,600
New Jersey	135,610	92		+240						56,948	78,994
New York:											
East	9,130	1		+140							9,271
West	18,220	92	249	−65				18,247			
Pennsylvania:											
East	188,928	155		−990						85,904	102,189
West	14,319	−17	8,616	−104	8,557	59		4,842	97	643	
West Virginia	2,438	−2	1,769	+38	1,501	36		538	399		
Total, District 1	443,595	443	10,859	−260	10,058	95		23,627	895	175,788	233,315
Illinois	191,517	15	80,065	−205	23,647	35		167,645			
Indiana	155,863	2	8,676	+320	473	897		154,584	231		
Kansas	109,104	15	133,421	+168	84,746	1,427		22,907	207		
Kentucky, Tennessee	38,230	8	28,268	+508	4,438	1,028	19,825	2,610	3	10,038	804
Michigan	50,408	24	10,180	+247	8,919	1,261		38,605	6		[1] 1,888
Minnesota, Wisconsin	23,993	10		+5					4,355	1,120	[1] 18,533
Missouri	19,997	−1		+146				20,142			
Nebraska	908	1	12,918	−7				870	32		
North and South Dakota	14,029		17,319	+38	13,454	613					
Ohio:											
East	37,440	−4		−53	8,495	413		33,475			
West	99,689	−4	5,854	+156	290	26		98,744		529	252
Oklahoma	134,577	82	188,301	+140	91,109	2,638		41,052			
Total, District 2	875,755	148	485,002	+1,463	230,571	8,338	19,825	580,634	4,834	11,687	21,477

Digitized by Google

Alabama, Mississippi	9,968	2	57,076	−16	5,393	355	1,238		248	2,584	136
Arkansas	21,691	−12	33,852	+47	19,805	1,034		827	60		
Louisiana	258,146	163	344,520	−384	134,887	1,503	48,331	70,937	98	1,132	1,037
New Mexico	8,804	−2	103,671	+26	8,619	209					
Texas	777,758	215	992,403	−333	566,513	7,144	31,601	119,748	15	44,008	8,611
Total, District 3	1,076,367	366	1,531,522	−660	735,217	10,245	81,170	191,512	421	47,724	9,784
Colorado	12,160	6	36,478	−42	274	751		10,844	255		
Montana	26,111	1	22,759	+78	8,376	747		16,889	163		[3] 15
Utah	30,413	4	34,166	+42	4,541	262		25,400	256		
Wyoming	37,354	3	137,210	+124	33,205	1,870			2,406		
Total, District 4	106,038	14	230,613	+202	46,396	3,630		53,133	3,080		15
California, Alaska	378,396	942	311,131	−883	260,583	9,529	33,115	19,548		159	55,521
Washington, Oregon	37,510	15	1	−125		1				7,313	[3] 30,086
Total, District 5	415,906	957	311,132	−1,008	260,583	9,530	33,115	19,548		7,472	85,607
Total 1959	2,917,661	1,928	2,569,128	−263	1,282,825	31,838	134,110	868,454	9,230	242,671	[4] 350,198
Daily average, 1959	7,994	5	7,039	−1	3,515	87	367	2,380	25	665	959
Daily average, 1958	7,606	9	6,654	−19	3,311	76	387	2,215	25	640	942

[1] Pipeline.
[2] Tank cars and trucks.
[3] Includes pipeline 12,948; boats 17,138.
[4] Excludes crude oil imported for direct fuel use.

59112—60—25

Digitized by Google

TABLE 33.—Daily average total demand for crude petroleum in the United States in 1958–59, by State of origin and month

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Year
1958													
Alabama	11.9	17.0	11.0	17.7	19.5	11.0	20.8	18.7	10.4	18.1	17.0	15.3	15.7
Arkansas	95.3	75.1	80.1	87.4	81.3	81.8	85.8	81.0	74.0	79.4	66.9	86.0	81.3
California	893.7	799.8	905.7	863.4	863.6	809.7	882.8	891.0	949.4	879.8	867.0	796.6	867.4
Colorado	142.7	141.9	135.0	140.6	120.8	156.0	128.1	135.3	123.1	127.3	138.4	137.0	135.4
Florida	3.7			.3	3.7	.5	.2			1.2	5.1	2.1	1.4
Illinois	231.5	236.4	233.1	202.2	195.2	226.3	219.0	227.9	234.2	224.8	202.9	220.5	221.1
Indiana	31.2	29.1	34.4	32.9	31.0	34.8	36.7	23.8	28.5	30.1	33.2	37.3	31.9
Kansas	329.0	354.3	298.0	267.1	358.1	337.2	345.2	327.3	344.5	295.3	349.1	343.9	328.9
Kentucky	50.1	42.3	43.8	46.3	48.1	44.8	39.2	45.7	55.3	48.7	47.8	68.6	48.4
Louisiana	836.5	849.5	887.9	838.5	859.4	863.8	821.2	827.4	911.0	863.8	935.1	925.4	868.2
Michigan	21.6	22.2	30.2	25.1	28.8	26.5	23.4	25.8	27.5	24.1	26.1	23.1	25.4
Mississippi	94.1	104.3	104.3	97.5	109.6	103.2	105.3	87.7	139.7	126.9	113.2	115.9	108.5
Montana	66.8	83.0	74.2	72.0	71.1	76.1	77.0	78.4	89.3	74.4	83.4	79.0	77.0
Nebraska	48.7	43.5	68.2	45.7	55.3	49.7	69.5	51.1	66.1	49.9	56.9	57.9	55.3
New Mexico	257.4	305.4	247.1	278.3	283.3	275.7	299.0	261.6	252.9	265.8	251.2	283.6	271.6
New York	6.9	7.1	6.6	7.0	6.5	3.6	3.4	3.2	3.3	3.3	2.9	3.0	4.7
North Dakota	43.2	43.4	28.0	42.1	45.2	46.9	44.7	45.5	10.9	23.0	46.4	49.7	39.1
Ohio	14.9	19.8	16.9	10.8	17.3	23.8	19.8	18.9	14.5	17.9	19.0	15.8	17.4
Oklahoma	582.8	579.7	513.5	543.2	547.2	582.7	573.6	547.0	509.1	555.4	545.5	559.8	553.2
Pennsylvania	22.0	18.1	15.5	18.0	19.2	18.9	23.8	15.3	23.7	14.6	16.4	18.4	18.7
Texas	2,726.0	2,634.5	2,516.3	2,498.4	2,455.3	2,436.6	2,542.7	2,730.0	2,646.3	2,620.0	2,654.5	2,725.5	2,599.0
Utah	8.9	3.2	7.2	26.3	38.3	85.9	74.2	115.4	54.1	125.1	82.2	92.6	59.9
West Virginia	5.5	8.0	6.2	6.6	6.1	5.8	6.0	3.9	4.1	9.2	7.1	7.5	6.3
Wyoming	310.7	284.7	284.4	267.6	317.0	325.6	355.7	368.3	338.3	345.4	311.0	336.0	320.8
Other States [1]	.6	.6	.6	.6	.5	.6	.6	.5	.6	.6	.4	.6	.6
Total domestic crude	6,835.7	6,702.9	6,548.2	6,435.6	6,581.4	6,627.5	6,797.7	6,930.7	6,910.8	6,824.1	6,878.7	7,001.1	6,757.2
Foreign crude	980.5	928.1	950.5	878.6	935.6	990.1	867.1	1,025.4	945.0	954.2	990.5	1,048.2	958.1
Grand total 1958	7,816.2	7,631.0	7,498.7	7,314.2	7,517.0	7,617.6	7,664.8	7,956.1	7,855.8	7,778.3	7,869.2	8,049.3	7,715.3
Pennsylvania Grade (included above)	37.2	39.8	33.8	34.4	36.2	33.7	38.6	26.1	34.4	31.8	30.4	34.0	34.2
1959 [2]													
Alabama	16.9	13.8	12.1	17.4	4.3	12.8	16.6	12.2	16.6	14.4	17.3	13.6	14.0
Arkansas	80.3	82.9	74.2	87.2	81.5	69.0	67.0	60.5	65.7	64.2	64.8	70.5	72.2
California	827.2	816.9	847.3	857.8	878.3	826.4	911.3	879.7	868.1	870.7	854.3	807.1	854.1
Colorado	125.8	127.0	133.9	108.7	120.6	119.5	138.1	123.4	132.6	128.3	97.0	145.2	125.1
Florida	.2	.7	.5	4.3	.5	.6	.5	.3	.6	4.1	.4	.7	1.1
Illinois	234.7	282.4	211.9	197.4	174.9	209.4	203.3	222.7	216.9	202.0	217.4	249.3	218.1
Indiana	41.6	32.5	32.8	29.4	31.0	33.9	33.4	33.2	33.7	29.9	34.3	37.6	33.6

Digitized by Google

Kansas	360.8	342.4	354.6	292.5	297.9	345.3	306.7	319.1	365.2	304.5	326.0	326.2	328.3
Kentucky	71.3	64.0	60.6	70.8	79.3	85.1	76.2	68.4	69.4	71.1	68.1	68.2	71.1
Louisiana	925.4	913.3	917.8	954.4	976.5	915.2	928.0	996.6	993.9	985.6	1,048.1	1,062.5	968.5
Michigan	25.8	26.6	26.2	25.0	27.3	23.6	32.3	24.3	19.3	34.6	30.7	35.6	27.7
Mississippi	120.8	120.0	122.0	125.5	134.9	122.5	127.4	142.2	150.5	128.5	138.4	143.1	131.4
Montana	74.2	81.0	91.7	82.0	75.4	65.2	72.5	86.1	97.5	56.0	90.5	93.7	80.4
Nebraska	65.2	59.2	45.8	69.6	44.7	63.3	70.1	70.1	67.9	72.1	63.8	70.2	63.5
New Mexico	268.5	287.3	292.0	326.3	257.1	287.7	276.8	296.7	296.9	276.0	300.4	294.5	288.2
New York	6.4	5.4	6.2	5.7	5.3	5.7	5.8	5.4	5.6	5.4	5.5	5.5	5.6
North Dakota	47.2	49.5	44.3	50.0	47.5	51.1	53.7	46.4	52.4	20.6	59.1	59.7	48.4
Ohio	16.9	6.2	23.7	11.6	19.2	15.9	13.1	16.0	13.1	15.0	15.9	15.4	15.3
Oklahoma	561.0	563.7	552.5	560.8	549.8	540.6	538.2	526.5	504.1	518.5	492.7	519.6	535.6
Pennsylvania	16.5	15.0	18.7	14.8	13.9	24.6	16.0	12.3	19.2	19.1	20.4	20.1	17.5
Texas	2,980.6	2,871.6	2,966.1	2,843.2	2,807.3	2,660.7	2,507.3	2,748.5	2,474.1	2,466.5	2,556.6	2,675.2	2,712.7
Utah	102.3	117.2	112.8	115.6	101.2	124.7	113.5	117.6	109.9	97.1	109.6	98.1	109.8
West Virginia	6.4	5.4	5.5	6.9	2.1	3.6	5.0	5.9	7.7	7.4	5.3	7.2	5.7
Wyoming	322.9	332.1	357.7	251.0	326.9	363.8	368.7	336.2	360.8	308.8	348.4	337.6	334.6
Other States [1]	1.2	.6	.3	.2	.3	.6	1.1	1.2	1.7	1.7	1.7	1.6	1.0
Total domestic crude	7,300.1	7,216.7	7,311.2	7,108.1	7,057.7	6,970.8	6,882.6	7,151.5	6,943.4	6,702.1	6,966.7	7,158.0	7,063.5
Foreign crude	997.0	960.8	948.5	802.9	875.6	1,051.1	1,031.3	964.0	965.9	978.9	1,046.8	1,025.0	970.8
Grand total 1959	8,297.1	8,177.5	8,259.7	7,911.0	7,933.3	8,021.9	7,913.9	8,115.5	7,909.3	7,681.0	8,013.5	8,183.0	8,034.3
Pennsylvania Grade (included above)	33.0	30.1	34.8	30.4	22.8	39.8	29.8	28.2	36.7	36.3	34.1	38.8	32.9

[1] Arizona, Missouri (1958 only), Nevada, South Dakota, Tennessee, Virginia, and Washington. [2] Preliminary figures.

Digitized by Google

TABLE 34.—Total demand for crude petroleum in the United States, 1958–59, by State of origin and month

(Thousand barrels)

State	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Alabama	370	476	341	531	606	333	645	579	312	562	511	473	5,739
Arkansas	2,956	2,104	2,482	2,622	2,520	2,455	2,660	2,510	2,220	2,462	2,007	2,666	29,664
California	27,705	22,393	28,077	25,901	26,772	24,290	27,367	27,620	28,482	27,275	26,009	24,695	316,586
Colorado	4,426	3,973	4,186	4,218	3,745	4,680	3,970	4,194	3,694	3,947	4,152	4,248	49,433
Florida	114	1		10	114	14	7	3		38	153	65	519
Illinois	7,177	6,619	7,227	6,066	6,050	6,789	6,790	7,065	7,027	6,970	6,086	6,835	80,701
Indiana	969	815	1,067	986	961	1,043	1,139	738	855	929	997	1,155	11,654
Kansas	10,198	9,919	9,238	8,012	11,102	10,116	10,701	10,145	10,336	9,155	10,474	10,661	120,057
Kentucky	1,554	1,185	1,357	1,389	1,490	1,344	1,215	1,416	1,660	1,509	1,435	2,126	17,680
Louisiana	25,930	23,786	27,524	25,156	26,642	25,914	25,458	25,650	27,331	26,778	28,053	28,686	316,908
Michigan	669	623	936	753	894	795	725	800	824	746	783	716	9,264
Mississippi	2,918	2,919	3,233	2,926	3,398	3,096	3,265	2,720	4,191	3,934	3,396	3,594	39,590
Montana	2,070	2,325	2,301	2,159	2,203	2,283	2,386	2,431	2,678	2,307	2,501	2,449	28,093
Nebraska	1,511	1,218	2,113	1,370	1,715	1,492	2,153	1,584	1,983	1,548	1,708	1,795	20,190
New Mexico	7,978	8,550	7,660	8,349	8,782	8,271	9,269	8,109	7,588	8,240	7,536	8,793	99,125
New York	213	200	206	210	203	108	104	98	98	102	87	94	1,723
North Dakota	1,340	1,216	867	1,262	1,400	1,408	1,386	1,411	329	713	1,391	1,541	14,264
Ohio	462	555	524	324	536	714	614	585	436	555	571	490	6,366
Oklahoma	18,066	16,231	15,919	16,296	16,964	17,481	17,783	16,956	15,274	17,217	16,364	17,356	201,907
Pennsylvania	683	506	481	540	594	566	738	476	710	453	492	570	6,809
Texas	84,507	73,765	78,004	74,953	76,114	73,097	78,825	84,629	79,390	81,219	79,634	84,489	948,626
Utah	266	90	224	788	1,187	2,576	2,299	3,579	1,623	3,877	2,466	2,871	21,846
West Virginia	172	225	193	199	190	173	186	122	124	285	213	231	2,313
Wyoming	9,633	7,972	8,815	8,028	9,829	9,769	11,027	11,416	10,148	10,706	9,331	10,417	117,091
Other States [1]	20	16	19	19	15	19	18	17	18	18	11	19	209
Total domestic crude	211,907	187,682	202,994	193,067	204,026	198,826	210,730	214,853	207,331	211,545	206,361	217,035	2,466,357
Foreign crude	30,394	25,988	29,466	26,357	29,005	29,703	26,881	31,788	28,347	29,583	29,716	32,492	349,720
Grand total 1958	242,301	213,670	232,460	219,424	233,031	228,529	237,611	246,641	235,678	241,128	236,077	249,527	2,816,077
Daily average:													
Domestic crude	6,836	6,703	6,548	6,436	6,581	6,628	6,798	6,931	6,911	6,824	6,879	7,001	6,757
Domestic and foreign crude	7,816	7,631	7,499	7,314	7,517	7,618	7,665	7,956	7,856	7,778	7,869	8,049	7,715
Pennsylvania Grade (included above)	1,153	1,114	1,047	1,033	1,122	1,010	1,196	810	1,033	985	912	1,055	12,470
1959 [2]													
Alabama	524	387	376	522	133	384	515	378	497	448	518	423	5,105
Arkansas	2,489	2,322	2,299	2,617	2,527	2,069	2,078	1,876	1,971	1,990	1,943	2,184	26,365
California	25,642	22,872	26,266	25,734	27,226	24,792	28,251	27,271	26,043	26,991	25,630	25,019	311,737
Colorado	3,899	3,555	4,151	3,262	3,739	3,584	4,281	3,827	3,977	3,978	2,910	4,500	45,663
Florida	6	20	16	130	17	18	14	10	18	128	11	23	411
Illinois	7,276	7,907	6,569	5,923	5,423	6,281	6,303	6,905	6,508	6,261	6,522	7,727	79,605

Digitized by Google

Indiana	1,289	910	1,013	882	962	1,018	1,035	1,029	1,012	927	1,029	1,165	12,271
Kansas	11,186	9,587	10,993	8,776	9,235	10,360	9,506	9,892	10,956	9,440	9,780	10,112	119,823
Kentucky	2,209	1,792	1,880	2,123	2,457	2,554	2,362	2,121	2,082	2,203	2,042	2,114	25,939
Louisiana	28,688	25,572	28,452	28,631	30,272	27,457	28,768	30,896	29,818	30,556	31,442	32,939	353,491
Michigan	801	745	812	749	846	707	1,002	753	580	1,073	921	1,104	10,093
Mississippi	3,746	3,360	3,782	3,764	4,182	3,676	3,950	4,409	4,514	3,982	4,151	4,435	47,951
Montana	2,299	2,268	2,842	2,459	2,339	1,956	2,249	2,669	2,924	1,736	2,715	2,906	29,362
Nebraska	2,022	1,657	1,420	2,088	1,386	1,898	2,172	2,172	2,037	2,236	1,915	2,177	23,180
New Mexico	8,323	8,044	9,052	9,788	7,969	8,631	8,579	9,198	8,907	8,556	9,013	9,129	105,189
New York	197	152	193	171	163	171	179	167	166	168	164	170	2,061
North Dakota	1,462	1,387	1,374	1,498	1,473	1,532	1,665	1,438	1,571	638	1,772	1,852	17,662
Ohio	524	172	735	349	595	476	407	496	394	466	478	476	5,568
Oklahoma	17,392	15,784	17,128	16,824	17,041	16,219	16,684	16,321	15,124	16,074	14,782	16,109	195,482
Pennsylvania	510	420	578	444	431	738	497	380	577	591	612	620	6,398
Texas	92,397	80,405	91,949	85,297	87,027	79,820	77,727	85,202	74,223	76,460	76,699	82,930	990,136
Utah	3,171	3,282	3,497	3,467	3,136	3,740	3,518	3,645	3,298	3,009	3,289	3,041	40,093
West Virginia	201	149	172	206	65	108	155	184	232	228	160	224	2,084
Wyoming	10,012	9,299	11,087	7,532	10,134	10,915	11,430	10,421	10,826	9,573	10,450	10,466	122,145
Other States [1]	39	19	10	7	12	19	34	35	48	52	53	49	377
Total domestic crude	226,304	202,067	226,646	213,243	218,790	209,123	213,361	221,695	208,303	207,764	209,001	221,894	2,578,191
Foreign crude	30,908	26,903	29,406	24,088	27,144	31,533	31,971	29,884	28,978	30,348	31,403	31,778	354,344
Grand total 1959	257,212	228,970	256,052	237,331	245,934	240,656	245,332	251,579	237,281	238,112	240,404	253,672	2,932,535
Daily average:													
Domestic crude	7,300	7,217	7,311	7,108	7,058	6,971	6,882	7,152	6,943	6,702	6,967	7,158	7,064
Domestic and foreign crude	8,297	8,178	8,260	7,911	7,933	8,022	7,914	8,116	7,909	7,681	8,013	8,183	8,034
Pennsylvania Grade (included above)	1,022	844	1,078	912	707	1,193	925	873	1,100	1,126	1,023	1,204	12,007

[1] Alaska, Arizona, Missouri (1958 only), Nevada, South Dakota, Tennessee, Virginia, and Washington. [2] Preliminary figures.

Digitized by Google

STOCKS

Total stocks of all oils increased 18.5 million barrels in 1959. Stocks of refined products increased 22 million barrels, stocks of natural-gas liquids rose 2.1 million barrels, and stocks of crude oil declined 5.6 million barrels. A warmer-than-normal fourth quarter of the year reduced demand for heating oils and resulted in high stocks of these oils at year end.

TABLE 35.—Stocks of crude petroleum, natural-gas liquids, and refined products in the United States at end of year, 1955–59

(Thousand barrels)

Product	1955	1956	1957	1958	1959
Crude petroleum:					
At refineries	66,852	71,721	76,576	69,568	69,305
Pipeline and tank farm	178,771	173,278	183,526	172,458	167,147
Producers	19,987	21,015	21,711	20,716	20,677
Total crude petroleum	265,610	266,014	281,813	[1] 262,742	257,129
Natural gas liquids	13,564	20,559	20,156	22,752	24,887
Refined products	435,685	493,818	537,937	[1] 504,044	526,026
Grand total	714,859	780,391	839,906	[1] 789,538	808,042

[1] New basis; includes Alaskan stocks as part of U.S. stocks as follows: Crude petroleum, 12,000 barrels; refined products, 730,000 barrels.

Digitized by Google

TABLE 36.—Stocks of crude petroleum in the United States in 1959, by State of origin and month [1]

(Thousand barrels)

State of origin	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	608	556	435	386	296	616	678	655	662	568	583	480	522
Alaska		6	7	1		4	9	7	13	9	8	8	12
Arkansas	2,071	2,092	1,886	1,863	1,679	1,642	2,012	2,146	2,220	2,254	2,204	2,144	2,035
California	33,327	33,865	34,490	34,365	33,903	32,938	33,631	31,555	30,369	29,537	28,490	28,023	28,913
Colorado	2,755	2,741	2,771	2,563	3,122	3,258	3,403	2,955	3,046	2,859	2,864	3,748	3,242
Florida	67	100	109	130	36	55	73	93	119	135	44	67	80
Illinois	8,996	8,626	6,860	6,826	7,403	8,407	8,531	8,812	8,496	8,399	8,810	8,728	7,826
Indiana	596	348	314	315	411	616	566	573	541	475	545	456	328
Kansas	10,037	9,266	8,902	8,439	9,965	10,636	10,118	10,508	10,191	9,014	9,668	9,628	9,728
Kentucky	1,652	1,426	1,425	1,672	1,981	2,158	2,125	2,135	2,211	2,290	2,244	2,172	2,056
Louisiana	16,227	16,763	17,774	17,517	17,770	17,527	18,416	18,549	17,557	17,119	18,104	17,678	17,347
Michigan	817	796	765	768	847	811	969	847	986	1,291	1,135	1,195	1,162
Mississippi	2,383	2,371	2,340	2,357	2,363	2,098	2,288	2,364	2,151	1,713	2,129	2,259	2,360
Montana	2,536	2,697	2,752	2,506	2,481	2,560	3,141	3,531	3,423	3,022	3,827	3,553	3,253
Nebraska	1,474	1,287	1,222	1,426	1,225	1,921	2,097	1,960	1,961	2,022	1,932	2,057	1,963
New Mexico	7,855	8,021	7,796	7,724	6,843	7,795	7,994	8,501	8,131	8,004	8,398	8,262	8,358
New York	123	114	105	71	60	55	54	43	43	43	43	43	43
North Dakota	811	823	820	1,046	976	957	971	852	926	856	1,365	1,069	1,106
Ohio	646	558	821	571	719	579	591	684	653	729	722	660	644
Oklahoma	17,408	17,170	17,310	17,633	17,952	17,889	17,738	16,599	15,542	15,600	15,776	17,396	18,413
Pennsylvania	1,460	1,429	1,465	1,385	1,456	1,536	1,318	1,339	1,462	1,414	1,360	1,279	1,218
South Dakota	2	2	2	2	3	3	3	4	4	5	5	7	5
Texas	117,428	115,331	115,690	113,184	113,005	114,881	116,227	115,618	107,317	108,610	110,516	110,618	111,132
Utah	3,132	3,300	3,051	3,009	2,781	3,022	2,829	2,833	2,552	2,487	2,797	2,661	3,148
West Virginia	560	529	546	555	537	646	726	759	753	710	676	687	653
Wyoming	13,778	14,154	14,081	13,618	16,560	16,780	16,248	15,784	16,415	15,976	17,380	17,195	17,601
Total domestic crude	246,749	244,371	243,739	239,932	244,374	249,390	252,756	249,706	237,744	235,141	241,625	242,073	243,148
Foreign [2]	15,981	13,737	16,301	15,008	13,190	15,135	19,749	15,288	15,347	15,855	15,832	13,880	13,981
Grand total	262,730	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129
Pennsylvania Grade (includes above)	2,367	2,297	2,339	2,231	2,309	2,529	2,347	2,437	2,548	2,460	2,359	2,312	2,154

[1] Final figures.

[2] Includes foreign crude petroleum held in District 5: December 1958, 5,685,000 barrels; January, 3,879,000; February, 5,096,000; March, 4,697,000; April, 3,968,000; May, 3,578,000; June, 4,537,000; July, 4,214,000; August, 5,020,000; September, 4,430,000; October, 4,559,000; November, 4,256,000; December, 4,524,000.

Digitized by Google

TABLE 37.—Stocks of crude petroleum in the United States in 1959, by location and month [1]

(Thousand barrels)

State	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Alabama	490	559	577	572	453	468	660	434	471	285	472	529	497
Alaska		6	7	1		4	9	7	13	9	8	8	12
Arizona	456	451	453	453	453	457	453	458	450	451	450	450	448
Arkansas	1,952	1,909	1,876	1,851	1,794	1,811	2,001	2,026	2,124	2,127	2,149	2,022	1,984
California, Oregon, Washington	39,745	38,446	40,550	40,003	38,653	36,607	37,901	35,864	35,214	33,794	33,026	32,439	33,815
Colorado	1,640	1,534	1,543	1,502	1,862	1,896	1,749	1,700	1,770	1,805	1,856	1,788	1,714
Florida, Georgia, South Carolina, Virginia	599	477	451	537	689	809	902	966	856	967	1,063	706	888
Illinois	15,548	14,197	13,382	13,924	14,746	16,204	16,418	16,002	15,485	15,263	15,853	16,017	15,693
Indiana	4,713	5,076	4,710	4,657	4,878	5,052	5,264	5,651	5,241	4,945	4,839	4,592	4,589
Iowa, Missouri	6,554	6,378	6,658	6,475	6,479	6,526	6,669	6,744	6,615	6,806	7,192	6,836	6,810
Kansas	10,280	9,880	9,376	10,042	11,689	12,904	12,350	11,509	10,876	9,780	10,500	10,742	10,657
Kentucky, Tennessee	2,991	2,797	2,978	3,073	3,530	3,648	3,504	3,709	3,900	3,831	3,718	3,765	3,676
Louisiana	13,665	13,952	13,927	14,292	13,621	14,424	14,648	13,985	13,310	14,078	14,231	13,864	13,815
Maryland	542	458	471	616	531	812	768	935	727	508	374	345	578
Massachusetts, Delaware, Rhode Island	1,437	1,633	1,594	1,202	1,765	1,278	1,365	1,675	1,899	1,873	2,113	1,900	1,606
Michigan	1,534	1,528	1,496	1,479	1,706	1,671	1,764	1,673	1,732	2,006	1,943	1,879	1,939
Minnesota, Wisconsin	1,312	1,218	1,266	1,241	1,597	1,529	1,368	1,206	1,461	1,329	1,361	1,349	1,317
Mississippi	1,866	2,073	1,886	1,822	1,985	1,802	1,739	1,873	1,881	1,742	1,944	1,948	1,939
Montana	1,741	1,810	1,790	1,699	2,035	2,064	1,965	1,810	1,751	1,723	2,333	1,977	1,852
Nebraska	1,566	1,625	1,719	1,602	1,788	1,796	1,664	1,614	1,658	1,692	1,798	1,700	1,736
New Jersey	5,146	5,188	6,766	6,183	4,184	5,108	6,434	6,417	5,651	6,730	6,361	5,906	5,400
New Mexico	3,102	3,378	3,441	4,011	3,225	3,729	3,311	3,342	3,136	3,227	3,207	2,954	3,598
New York	721	564	749	845	633	770	1,165	874	821	990	826	841	866
North Dakota	797	778	788	1,007	905	858	869	750	730	648	1,164	885	896
Ohio	6,651	6,645	5,479	5,724	6,124	6,987	6,912	6,876	6,388	6,745	6,444	7,160	6,646
Oklahoma	22,662	21,974	21,685	19,564	18,954	19,366	20,130	21,158	19,746	19,216	20,628	20,938	21,069
Pennsylvania	9,442	10,386	10,811	9,895	9,297	9,897	10,687	10,536	9,865	9,375	9,781	8,606	8,553
South Dakota	1	1	1	1	1	1	1	1	1	1	1	1	4
Texas	96,067	93,704	94,799	91,631	93,979	95,364	99,399	94,921	88,728	88,317	90,038	90,882	92,269
Utah	810	957	903	854	843	1,043	1,102	838	784	888	929	1,126	947
West Virginia	536	534	543	534	542	579	601	687	668	694	705	661	639
Wyoming	8,104	7,932	7,367	7,567	8,623	9,061	8,733	8,753	9,139	9,151	10,180	11,107	10,677
Total	262,730	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129

[1] Final figures.

Digitized by Google

TABLE 38.—Stocks of crude petroleum in the United States in 1959, by classification and location [1]

(Thousand barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
At refineries:													
Alabama	228	207	234	220	158	208	223	211	146	133	190	275	237
Arkansas	469	474	387	403	402	439	521	545	551	585	608	509	516
California, Oregon, Washington	15,852	14,590	15,766	15,772	15,020	14,683	15,577	15,141	15,744	15,557	14,858	14,182	14,844
Colorado	181	146	106	133	284	251	202	215	237	279	270	230	139
Florida, Georgia, South Carolina, Virginia	532	377	342	519	653	754	829	873	737	945	1,019	639	808
Illinois	4,047	3,735	3,454	3,468	3,596	4,174	4,043	3,798	3,639	3,464	3,588	3,758	3,842
Indiana	1,629	2,071	2,021	2,014	2,012	1,794	1,948	2,186	1,942	1,951	1,885	1,686	1,949
Kansas	1,395	1,386	1,368	1,332	1,714	1,595	1,490	1,315	1,382	1,263	1,304	1,353	1,563
Kentucky, Tennessee	926	892	1,140	1,115	1,223	1,184	1,059	1,154	1,314	1,236	1,084	1,256	1,434
Louisiana	5,020	4,994	4,499	4,970	4,698	4,539	5,073	4,953	4,612	4,779	4,919	4,509	4,636
Maryland	542	458	471	616	531	812	768	935	727	508	374	345	578
Massachusetts, Delaware, Rhode Island	1,437	1,633	1,594	1,292	1,765	1,278	1,365	1,675	1,899	1,873	2,113	1,900	1,606
Michigan	619	715	645	707	816	764	840	756	808	848	780	703	866
Minnesota, Wisconsin	1,312	1,218	1,266	1,241	1,597	1,529	1,368	1,206	1,461	1,329	1,361	1,349	1,317
Mississippi	91	93	78	79	83	89	90	132	94	90	120	85	66
Missouri	317	332	332	335	301	350	375	467	474	477	473	482	463
Montana	544	636	635	563	823	824	811	664	628	573	587	540	622
Nebraska	53	51	57	60	56	37	41	51	43	46	28	35	46
New Jersey	5,146	5,070	6,594	6,068	4,184	5,108	6,317	6,297	5,403	6,369	6,229	5,779	5,386
New Mexico	202	201	215	238	239	215	200	172	184	199	128	192	228
New York	549	434	579	639	425	543	928	626	598	743	601	605	624
North Dakota	342	266	284	394	372	301	300	270	261	147	573	379	380
Ohio	1,310	1,522	1,235	1,292	1,625	1,453	1,591	1,600	1,384	1,433	1,355	1,756	1,413
Oklahoma	2,646	2,631	2,287	2,327	2,551	2,429	2,520	2,376	2,276	2,354	2,412	2,636	2,786
Pennsylvania	7,828	8,716	9,242	8,462	7,598	8,054	8,782	8,610	7,803	7,299	7,730	6,632	6,734
Texas	15,275	15,210	15,507	16,224	16,294	16,096	17,343	15,890	14,565	15,524	15,793	14,863	14,942
Utah	341	353	409	392	367	506	565	329	348	444	477	539	383
West Virginia	33	30	46	39	44	34	45	69	44	54	62	42	71
Wyoming	702	692	673	692	783	883	915	859	831	768	778	807	826
Total at refineries	69,568	69,136	71,466	71,606	70,214	71,016	76,138	73,375	70,135	71,270	71,099	68,057	69,305
Pipeline and tank-farm stocks:													
Alabama	210	316	282	305	258	149	382	204	308	136	262	237	242
Arkansas	1,123	1,130	1,129	1,093	1,017	1,022	1,125	1,091	1,188	1,152	1,151	1,137	1,108
California, Arizona	19,810	19,791	20,740	20,167	19,581	17,868	18,105	16,632	15,411	14,156	14,039	14,149	14,861
Colorado	1,279	1,198	1,252	1,189	1,398	1,490	1,387	1,340	1,383	1,376	1,436	1,418	1,425
Florida, New Jersey	59	207	274	129	28	45	181	206	356	372	164	183	83
Illinois	10,941	9,892	9,358	9,906	10,610	11,460	11,830	11,674	11,301	11,264	11,730	11,724	11,302
Indiana	3,014	2,935	2,619	2,573	2,796	3,188	3,246	3,395	3,229	2,924	2,884	2,836	2,570
Iowa, Missouri	6,237	6,046	6,326	6,140	6,178	6,176	6,294	6,277	6,141	6,329	6,719	6,354	6,347
Kansas	8,210	7,774	7,333	8,040	9,315	10,584	10,215	9,489	8,789	7,847	8,521	8,694	8,434

See footnote at end of table.

Digitized by Google

TABLE 38.—Stocks of crude petroleum in the United States in 1959, by classification and location [1]—Continued

(Thousand barrels)

Classification and location	Jan. 1	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Pipeline and tank-farm stocks—Con.													
Kentucky, Tennessee	2,005	1,845	1,783	1,903	2,252	2,409	2,390	2,500	2,531	2,540	2,569	2,444	2,182
Louisiana	6,875	7,138	7,603	7,492	7,108	8,070	7,870	7,307	6,968	7,499	7,427	7,435	7,279
Michigan	750	643	681	602	725	737	759	757	759	993	983	986	898
Mississippi	1,405	1,560	1,408	1,358	1,527	1,328	1,275	1,376	1,407	1,342	1,444	1,463	1,508
Montana	827	809	785	757	837	855	779	781	763	785	1,396	1,082	890
Nebraska	1,393	1,446	1,532	1,412	1,612	1,634	1,493	1,438	1,490	1,521	1,640	1,535	1,565
New Mexico	1,750	2,022	2,021	2,588	1,836	2,269	1,931	1,995	1,757	1,858	1,884	1,547	2,205
New York	142	100	140	176	178	197	207	218	193	217	195	206	212
North Dakota	202	210	203	205	206	205	205	204	202	204	231	232	237
Ohio	5,261	5,043	4,164	4,352	4,419	5,454	5,241	5,196	4,924	5,232	5,009	5,324	5,153
Oklahoma	18,526	17,853	17,888	15,792	14,958	15,360	16,098	17,240	15,908	15,335	16,714	16,825	16,836
Pennsylvania	1,464	1,520	1,419	1,283	1,549	1,693	1,755	1,776	1,912	1,926	1,901	1,824	1,669
Texas	73,403	71,275	71,548	67,818	70,251	71,424	74,752	71,677	66,964	65,699	66,856	68,360	69,923
Utah	412	555	434	411	423	508	499	480	401	409	417	551	529
West Virginia	338	339	332	330	333	380	391	453	459	475	478	454	403
Wyoming	6,822	6,580	6,034	6,195	7,160	7,493	7,153	7,214	7,708	7,783	8,817	9,720	9,286
Total pipeline and tank-farm stocks	172,458	168,227	167,288	162,216	166,555	171,998	175,563	170,920	162,452	159,374	164,867	166,720	167,147
Producers' stocks	20,704	20,745	21,286	21,118	20,795	21,511	20,804	20,699	20,504	20,352	20,921	21,176	20,677
Grand total: 1959	262,730	258,108	260,040	254,940	257,564	264,525	272,505	264,994	253,091	250,996	257,487	255,953	257,129
1958	281,813	284,539	285,048	278,534	273,959	263,105	253,550	246,556	244,810	251,701	255,345	257,546	262,730

[1] Final figures.

Digitized by Google

VALUE AND PRICE

The average value of crude oil at the well in 1959 was $2.90 per barrel—11 cents below the 1958 average. The total value of crude oil at the well was $7,476 million in 1959.

The posted price on West Texas crude was cut 7 cents a barrel in January. In February, crude oil from the Panhandle area of Texas was cut 12 cents a barrel and some New Mexico crude 17 cents a barrel. Posted prices then held fairly steady until July, when East Texas crude dropped 20 cents per barrel. In September posted prices in California dropped 10 to 50 cents per barrel for various crude oils.

TABLE 39.—Value of crude petroleum at wells in the United States, 1958–59, by States

State	1958		1959 [1]	
	Total value at wells (thousand dollars)	Average value per barrel	Total value at wells (thousand dollars)	Average value per barrel
Arkansas	$80,934	$2.82	$72,931	$2.77
California	909,649	2.90	783,684	2.55
Colorado	145,721	2.99	133,835	2.90
Illinois	240,825	3.00	234,521	2.99
Indiana	35,711	3.01	35,649	2.97
Kansas	359,826	3.00	347,786	2.91
Kentucky	51,652	2.95	74,024	2.81
Louisiana:				
Gulf Coast	890,611	3.27	976,525	3.16
Northern	132,906	3.20	143,590	3.15
Total Louisiana	1,023,517	3.26	1,120,115	3.16
Michigan	27,366	2.94	30,688	2.94
Mississippi	113,004	2.86	136,116	2.84
Montana	74,086	2.65	77,002	2.56
Nebraska	59,897	2.94	68,167	2.88
New Mexico:				
Southeastern	269,566	2.99	260,467	2.87
Northwestern	24,408	2.92	40,927	2.74
Total New Mexico	293,974	2.98	301,394	2.85
New York	7,457	4.23	8,399	4.24
North Dakota	42,634	2.99	50,288	2.80
Ohio	18,091	2.89	15,974	2.87
Oklahoma	594,069	2.96	573,742	2.92
Pennsylvania	26,535	4.10	25,855	4.20
Texas: [2]				
Gulf Coast	595,562	3.32	602,858	3.29
East Texas proper	168,298	3.20	171,963	3.20
West Texas	1,225,422	2.99	1,253,171	2.85
Other districts	883,107	2.96	903,851	2.93
Total Texas	2,872,389	3.06	2,931,843	2.98
Utah	74,185	2.99	114,712	2.86
West Virginia	7,629	3.49	7,837	3.60
Wyoming	301,643	2.61	314,920	2.50
Other States [3]	19,179	2.93	16,887	2.90
Total United States	7,379,973	3.01	7,476,369	2.90

[1] Preliminary figures.
[2] Texas Railroad Commission divisions.
[3] Alabama, Alaska (1959), Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, and Washington.

Digitized by Google

TABLE 40.—Posted price per barrel of petroleum at wells in the United States in 1959, by grade, with date of change [1]

Date	Pennsylvania Grade		Corning Grade	Western Kentucky	Indiana-Illinois Basin	Cold-water, Mich.	Oklahoma-Kansas [2]	
	Bradford and Allegheny districts	In southwest Pennsylvania					34°-34.9°	36°-36.9°
Jan. 1	$4.05	$3.58	$2.72	$3.00	$3.00	$3.10	$2.96	$3.00
Feb. 20							2.91	2.97
Apr. 1	4.15	3.70						
May 1	4.25	3.80						
Sept. 12	4.40	3.95						

Date	Panhandle Texas (Carson, Gray, Hutchinson, and Wheeler Counties)	West Texas 30°-30.9° (sweet)	Lea County N. Mex. 30°-30.9° (sour)	South Texas Mirando 24°-24.9°	East Texas	Gulf Coast			
						Conroe, Tex.	Texas		Louisiana 30°-30.9°
							30°-30.9°	20°-20.9°	
Jan. 1	$2.92	$2.88	$2.82	$3.23	$3.25	$3.53	$3.20	$3.00	$3.10
Jan. 15		2.81							
Feb. 3			2.65						
Feb. 24	2.80								
July 20					3.05				

Date	Rodessa, La. 36°-36.9°	Smackover, Ark.	Elk Basin, Wyo. 30°-30.9°	California			
				Coalinga 32°-37.9°	Kettleman Hills 37°-37.9°	Midway-Sunset 19°-19.9°	Wilmington 24°-24.9°
Jan. 1	$3.07	$2.68	$2.63	$3.20	$3.54	$2.26	$2.81
Jan. 26					3.45		
Mar. 1				2.82			
Apr. 1				3.20			
Sept. 1				2.70			
Sept. 11					3.21	2.16	2.58

[1] Source: Platt's Oil Price Handbook and Oilmanac, 1959, compiled and published by McGraw-Hill Publishing Co., Inc.
[2] Price changes are those of Continental Oil Co. posted in Platt's Oil Price Handbook.

REFINED PRODUCTS

GENERAL REVIEW

Petroleum is consumed in many finished products that must be considered individually. Competition with other fuels and economic and climatic conditions influence the consumption of these products.

Gasoline is consumed principally in highway transport, aviation, and mechanized farming. The demand for kerosine (a product defined as meeting lamp-oil specifications for color and flashpoint) has been drastically affected, especially in rural areas, by the increased competition from electricity and liquefied petroleum. Distillate fuel oil, including light diesel oils, is used for space heating and for diesel locomotive fuel and has nearly replaced residual fuel oil and coal in railroad use. Residual fuel oil usually sells for less than crude oil at the refineries, and competes directly with natural gas and coal for

Digitized by Google

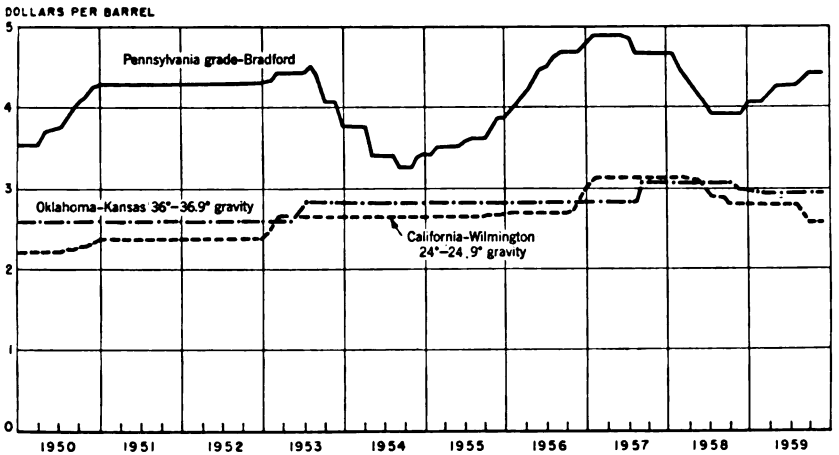

FIGURE 4.—Posted prices of selected grades of crude petroleum in the United States, 1950–59, by months.

heavy fuel uses. As it cannot be moved by pipeline, its distribution depends on cheap water transport and limited tankcar movement. Therefore, it cannot normally compete with coal in coal-producing areas. Liquefied gases, in competition with kerosine and light distillate fuel oil in domestic use, are gaining in importance as fuels in internal combustion engines and as the initial raw material in synthesizing many petrochemicals. Jet fuels (a blend of gasoline, kerosine, and distillate fuel oils) are replacing gasoline in military combat aircraft.

The total demand for all oils in 1959 averaged 9,662,000 barrels daily, a 3.2-percent increase for the year. Domestic demand increased 3.7 percent.

Exports of petroleum declined from 276,000 barrels per day in 1958 to 240,000 barrels in 1959. The inclusion of Alaska with the United States accounted for 14,000 barrels a day of the decline in exports and the increase in domestic demand.

Domestic demand in 1959 averaged 9,422,000 barrels daily (9,571,000 barrels daily in the first half of the year and 9,276,000 in the last half). The steel strike which lasted from July 1 until November 9, 1959, and its effect on industrial activity curtailed demand by approximately 100,000 barrels a day. Weather, in the last quarter of the year, averaged about 5 percent warmer than normal and curbed the demand for fuel oils.

Military purchases from domestic sources averaged 460,000 barrels daily in 1959 compared with 443,000 barrels in 1958.

The new supply of refined products comprises the refinery output from crude oil, the production of natural-gas liquids, a small quantity of motor benzol derived from coal, and imports of refined products from other countries. Crude runs to stills, the production of natural-gas liquids, and imports increased at a rate exceeding demand in 1959 and resulted in a stock increase of 18.5 million barrels.

Digitized by Google

The yield of gasoline from crude oil declined from 45.2 percent in 1958 to 44.9 percent in 1959. This decline was due to the lower throughput of unfinished oils. The restrictions imposed by the Oil Imports Administration on imports of unfinished oils for further refining sharply reduced the receipts of this foreign oil which had a high gasoline content. Total demand for gasoline increased 2.6 percent in 1959, and stocks of gasoline showed only a slight increase.

The monthly wholesale-price index of petroleum and petroleum products decreased from 117.7 in 1958 to 116.6 in 1959. The wholesale prices of the four principal products averaged 9.22 cents per gallon compared with 9.27 cents in 1958.

The average price of Regular-Grade gasoline at refineries in Oklahoma reached a high for the year of 12.75 cents per gallon in April but declined to 11.56 cents in December; the average for the year was 12.32 cents or 0.11 cent lower than for 1958. Prices of kerosine and distillate and residual fuel oil at Oklahoma refineries were high during the first half of 1959 and offset the low prices in the second half of the year, so that the average annual prices of these products increased over 1958.

TABLE 41.—Salient statistics of the major refined petroleum products in the United States, 1955–59

(Thousand barrels)

	1955	1956	1957	1958	1959 [1] [2]	1959 [1] [3]
Gasoline (finished and natural):						
Production	1,373,950	1,428,807	1,438,140	1,439,511	1,488,058	1,488,058
Imports	4,809	1,682	2,906	13,773	12,777	12,791
Exports	34,521	35,572	38,588	27,403	22,829	20,831
Stocks, end of year (old basis)	165,433	187,271	196,776	186,760	186,782	
Stocks, end of year (new basis)				187,004		187,115
Domestic demand	1,334,205	1,373,079	1,392,953	1,435,897	1,477,984	1,479,907
Kerosine:						
Production	117,137	123,480	108,929	110,008	110,662	110,662
Transfers from gasoline plants [4]	1,950	1,781	1,780	1,294	1,001	1,001
Imports		10	30	34	114	114
Exports	3,335	3,297	5,258	1,217	1,058	1,030
Stocks, end of year (old basis)	26,770	31,420	29,200	26,040	26,800	
Stocks, end of year (new basis)				26,049		26,817
Domestic demand	116,908	117,324	107,701	113,279	109,959	109,979
Distillate fuel oil:						
Production	602,547	665,687	668,573	631,405	678,938	678,938
Transfers from gasoline plants [4]	615	818	866	773	807	807
Transfers from crude	1,347	1,375	1,305	950	970	970
Imports	4,413	5,159	8,566	14,892	17,477	17,477
Exports	24,605	34,535	47,752	18,942	15,913	13,264
Stocks, end of year (old basis)	111,333	133,981	149,449	125,101	150,549	
Stocks, end of year (new basis)				125,508		151,030
Domestic demand	581,128	615,856	616,090	653,426	656,831	659,406
Residual fuel oil:						
Production	420,331	426,699	415,656	363,358	347,900	347,900
Transfers from crude	5,559	6,439	13,884	10,965	7,386	7,386
Imports	152,035	162,869	173,299	182,036	223,255	223,255
Exports	33,799	27,877	38,570	25,743	26,650	26,040
Stocks, end of year (old basis)	39,174	44,491	59,959	59,508	53,144	
Stocks, end of year (new basis)				59,560		53,261
Domestic demand	557,057	562,813	548,801	531,067	558,255	558,800
Jet fuel:						
Production	56,648	66,443	63,322	73,676	92,933	92,933
From gasoline	43,262	51,472	46,007	53,195	64,225	64,225
From kerosine	9,887	11,124	12,572	14,516	19,555	19,555
From distillate	3,499	3,847	4,743	5,965	9,153	9,153

See footnotes at end of table.

Digitized by Google

TABLE 41.—Salient statistics of the major refined petroleum products in the United States, 1955–59—Continued

(Thousand barrels)

	1955	1956	1957	1958	1959 [1] [2]	1959 [1] [3]
Jet fuel—Continued						
Transfers from gasoline plants [4]				1,024	870	870
Imports	(5)	7,763	9,185	20,810	13,682	13,682
Exports	120	186	119	211	461	390
Stocks, end of year (old basis)	3,457	5,322	4,749	5,871	8,728	
Stocks, end of year (new basis)				5,887		8,741
Domestic demand	56,286	72,155	72,961	94,177	104,167	104,241
Lubricants:						
Production	55,836	59,211	55,723	51,298	56,111	56,111
Exports:						
Grease	440	428	428	349	394	394
Oil	13,858	13,431	13,398	12,654	13,783	13,739
Stocks, end of year (old basis)	8,763	10,182	10,864	9,687	8,947	
Stocks, end of year (new basis)				9,689		8,950
Domestic demand	42,477	43,933	41,215	39,472	42,674	42,717
Wax (1 barrel=280 pounds):						
Production	5,293	5,367	5,461	5,252	5,630	5,630
Imports				5	21	21
Exports	1,248	920	1,023	911	1,033	1,033
Stocks, end of year	551	658	666	712	774	774
Domestic demand	4,056	4,340	4,430	4,300	4,556	4,556
Coke (5 barrels=1 short ton):						
Production	28,337	31,095	33,466	37,808	41,117	41,117
Exports	4,517	6,423	5,225	4,405	4,680	4,680
Stocks, end of year	1,524	1,319	2,534	4,818	5,705	5,705
Domestic demand	24,403	24,877	27,026	31,119	35,550	35,550
Asphalt (5.5 barrels=1 short ton):						
Production	83,121	90,636	85,683	89,380	97,643	97,643
Imports	3,325	3,606	6,391	7,478	6,869	6,869
Exports	1,567	1,513	1,788	1,364	1,089	1,032
Stocks, end of year (old basis)	7,768	9,150	10,463	9,757	10,939	
Stocks, end of year (new basis)				9,757		10,948
Domestic demand	84,286	91,347	88,973	96,200	102,241	102,289
Road oil:						
Production	8,482	8,027	7,209	5,925	6,493	6,493
Stocks, end of year	560	501	587	417	653	653
Domestic demand	8,356	8,086	7,123	6,095	6,257	6,257
Still gas (1 barrel=3,600 cu. ft.):						
Production	116,506	121,993	125,720	125,951	127,986	127,986
Liquefied gases:						
Production [6]	43,615	51,962	53,437	57,623	67,664	67,664
Transfers of liquefied gas [7] from natural-gasoline plants	108,325	114,208	117,029	123,194	146,422	146,422
Exports	4,277	4,274	4,526	2,827	2,252	2,252
Stocks, end of year	1,032	1,393	1,913	2,207	2,520	2,520
Domestic demand	147,572	161,535	165,420	177,696	211,521	211,521
Miscellaneous:						
Production	10,806	12,493	15,816	18,718	21,854	21,854
Transfers from gasoline plants [4]	2,677	2,347	1,664	1,460	1,672	1,672
Imports					4	4
Exports	330	306	269	266	272	272
Stocks, end of year	1,327	1,476	1,811	2,409	2,281	2,281
Domestic demand	13,062	14,385	16,876	19,314	23,386	23,386
Unfinished gasoline:						
Rerun (net)	(8)	(8)	(8)	(8)	(8)	(8)
Stocks, end of year	(8)	(8)	(8)	(8)	(8)	(8)
Other unfinished oils:						
Rerun (net)	11,231	4,008	−1,355	32,493	25,868	25,868
Transfers of other products from natural-gasoline plants	(4)	(4)	(4)	(4)	(4)	(4)
Imports	5,561	2,669	957	33,554	23,072	23,072
Stocks, end of year	67,993	66,654	68,966	70,027	67,231	67,231
Shortage	(12,356)	(15,704)	(15,159)	(23,192)	(31,509)	(31,509)

[1] Preliminary figures.
[2] Old basis; comparable to 1958, that is, excluding Alaska.
[3] New basis; includes Alaska as part of the United States.
[4] Production at natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[5] Imports of jet fuel formerly included with gasoline.
[6] Liquefied refinery gases (LR-gases).
[7] Liquefied petroleum gases (LP-gases).
[8] Included with gasoline (finished and natural).

Digitized by Google

TABLE 42.—Input and output of petroleum products at refineries in the United States, 1955–59

(Thousand barrels)

	1955	1956	1957	1958	1959 [1]
Input:					
Crude petroleum:					
Domestic	2,446,833	2,563,655	2,529,672	2,444,229	[2] 2,565,504
Foreign	283,385	341,451	360,764	345,175	352,157
Total crude petroleum	2,730,218	2,905,106	2,890,436	2,789,404	[2] 2,917,661
Natural-gas liquids	126,382	135,062	150,090	137,269	153,323
Total input	2,856,600	3,040,168	3,040,526	2,926,673	3,070,984
Output:					
Gasoline	1,331,528	1,396,787	1,415,335	1,411,956	1,473,430
Kerosine [3]	117,137	123,480	108,929	110,008	110,662
Distillate fuel oil [3]	602,547	665,687	668,573	631,405	678,938
Residual fuel oil	420,331	426,699	415,656	363,358	347,400
Jet fuel	56,648	66,443	63,322	73,676	92,933
Lubricants	55,836	59,211	55,723	51,298	56,111
Wax [4]	5,293	5,367	5,461	5,252	5,630
Coke [4]	28,337	31,095	33,466	37,808	41,117
Asphalt [4]	83,121	90,636	85,683	89,380	97,613
Road oil	8,482	8,027	7,209	5,925	6,493
Still gas	116,506	121,993	125,720	125,951	127,986
Liquefied gases	43,615	51,962	53,437	57,623	67,664
Other finished products	10,806	12,493	15,816	18,718	21,854
Other unfinished oils (net)	[5] 11,231	[5] 4,008	1,355	[5] 32,493	[5] 25,868
Shortage (or average) [6]	−12,356	−15,704	−15,159	−23,192	−31,509
Total output	2,856,600	3,040,168	3,040,526	2,926,673	3,070,984

[1] Preliminary figures.
[2] Includes 187,000 barrels produced in Alaska, which would be foreign crude oil on an old basis.
[3] Production at natural gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[4] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels asphalt to the short ton.
[5] Negative quantity; represents net excess of unfinished oils rerun over unfinished oil produced.
[6] Includes losses or gains in volume during processing.

Digitized by Google

TABLE 43.—Percentage yields of refined petroleum products in the United States, 1950–59 [1]

Product	1950	1951	1952 [2]	1953	1954	1955	1956	1957	1958	1959 [3]
Finished products:										
Gasoline	43.0	42.4	42.4	43.9	43.8	44.0	43.4	43.8	45.2	44.9
Kerosine	5.6	5.7	5.3	4.8	4.8	4.3	4.2	3.8	3.9	3.8
Distillate fuel oil	19.0	20.0	21.2	20.7	21.3	22.0	22.9	23.1	22.4	23.1
Residual fuel oil	20.2	19.7	18.5	17.6	16.4	15.3	14.7	14.4	12.9	11.8
Jet fuel [4]	----	----	.8	1.4	1.8	2.1	2.3	2.2	2.6	3.2
Lubricating oil	2.5	2.6	2.3	2.1	2.1	2.0	2.0	1.9	1.8	1.9
Wax	.2	.2	.2	.2	.2	.2	.2	.2	.2	.2
Coke	.8	.8	.7	.8	1.0	1.0	1.1	1.2	1.3	1.4
Asphalt	2.8	2.8	2.9	2.8	2.9	3.0	3.1	3.0	3.2	3.3
Road oil	.3	.3	.3	.3	.3	.3	.3	.2	.2	.2
Still gas	4.0	4.1	3.9	4.0	4.0	4.3	4.2	4.3	4.4	4.3
Liquefied gases	(5)	(5)	1.3	1.3	1.3	1.6	1.8	1.9	2.0	2.3
Other finished products	1.6	1.7	.3	.4	.4	.4	.4	.5	.7	.7
Shortage	----	−.3	−.1	−.3	−.3	−.5	−.6	−.5	−.8	−1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] Other unfinished oils added to crude in computing yields.
[2] Yields computed on the 1953 basis to show jet fuel separately.
[3] Preliminary figures.
[4] For 1950 and 1951, jet fuel was included in statistics of gasoline, kerosine, and distillate fuel oil.
[5] For 1950 and 1951, statistics on liquefied gases were included in "Other finished products."

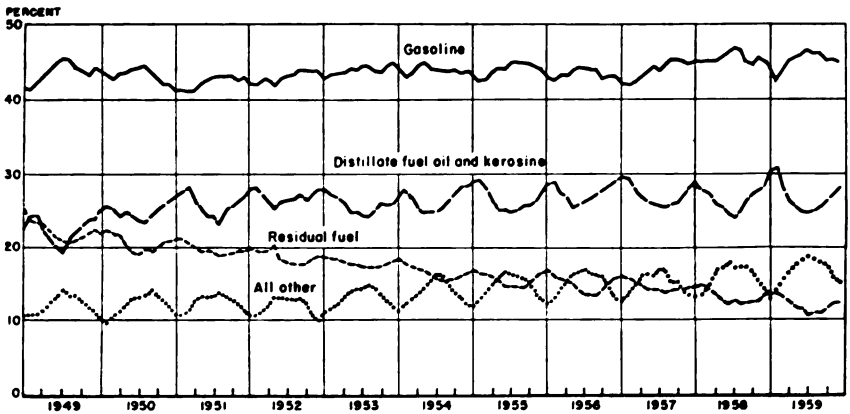

FIGURE 5.—Yield of principal products from crude runs to stills in the United States, 1949–59, by months.

Digitized by Google

TABLE 44.—Stocks of refined petroleum products in the United States at end of month, 1958–59

(Thousand barrels)

Product	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31	Dec. 31 [1]
1958													
Gasoline [2]	207,115	215,930	218,705	206,340	195,188	186,276	180,705	177,351	175,337	170,120	178,574	186,760	187,004
Kerosine	23,073	17,202	16,706	18,729	21,437	24,167	25,655	28,662	31,259	31,877	32,120	26,040	26,049
Distillate fuel oil	122,375	87,906	75,315	76,239	89,160	105,311	119,437	139,862	155,412	164,686	161,192	125,101	125,508
Residual fuel oil	57,562	55,095	54,929	57,975	61,589	63,864	66,457	67,230	67,670	67,045	66,223	59,508	59,560
Jet fuel	4,801	4,451	4,488	4,981	5,494	5,752	6,004	6,253	6,145	5,373	5,184	5,871	5,887
Lubricating oil	11,284	11,360	11,218	11,090	11,011	10,659	10,574	10,215	10,037	9,765	9,412	9,687	9,689
Wax	702	694	719	721	735	743	692	699	708	665	733	712	712
Coke	2,795	2,879	3,112	3,347	3,642	3,625	3,976	4,105	4,226	4,412	4,655	4,818	4,818
Asphalt	11,790	13,269	14,554	15,698	15,465	13,953	12,294	10,256	8,696	7,351	8,416	9,757	9,757
Road oil	484	513	666	735	968	923	894	627	578	421	443	417	417
Liquefied refinery gases	1,641	1,654	1,859	1,955	2,110	2,075	2,139	2,244	2,409	2,353	2,496	2,207	2,207
Miscellaneous	1,932	2,046	2,193	2,233	2,255	2,152	2,187	2,201	1,996	2,053	2,131	2,409	2,409
Other unfinished oils	67,798	65,945	69,108	71,148	74,911	77,974	74,199	73,836	73,057	73,481	74,831	70,027	70,027
Total 1958	513,352	478,944	473,572	471,191	483,965	497,474	505,213	523,541	537,530	539,602	546,410	503,314	504,044
1959 [3]													
Gasoline [2]	198,812	210,098	218,288	209,988	205,298	195,726	184,947	181,585	173,827	173,937	180,697	186,752	
Kerosine	21,079	19,714	18,674	20,987	24,583	27,349	28,317	31,209	31,550	32,387	30,685	26,800	
Distillate fuel oil	96,481	83,706	80,108	85,683	102,350	120,426	139,909	163,702	173,664	181,405	170,701	150,549	
Residual fuel oil	55,160	54,124	57,127	53,249	55,727	55,390	54,430	57,764	59,343	59,414	58,494	53,144	
Jet fuel	6,241	6,483	7,863	7,828	7,948	7,983	7,980	8,403	7,919	8,029	8,417	8,728	
Lubricating oil	9,492	9,727	9,405	9,168	8,909	8,393	8,399	8,271	8,375	8,234	8,789	8,947	
Wax	714	683	684	715	741	721	701	711	709	697	720	774	
Coke	4,973	5,207	5,471	5,469	5,657	5,892	6,015	5,927	5,816	5,482	5,569	5,705	
Asphalt	11,252	12,726	14,270	15,235	15,320	14,209	12,829	11,390	9,983	9,578	10,223	10,939	
Road oil	414	540	748	1,057	1,317	1,201	1,024	821	665	613	594	653	
Liquefied refinery gases	1,846	1,948	2,090	2,286	2,510	2,615	2,803	2,863	2,966	2,991	2,741	2,520	
Miscellaneous	2,339	2,212	2,509	2,349	2,469	2,282	2,303	2,369	2,196	2,285	2,336	2,281	
Other unfinished oils	68,757	66,187	66,363	70,600	73,683	70,875	72,274	71,621	70,980	70,538	70,611	67,231	
Total 1959 [3]	477,560	473,355	483,660	484,614	506,522	513,062	521,931	546,636	547,993	555,590	550,577	525,053	

Digitized by Google

1959 [4]													
Gasoline [2]	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115	
Kerosine	21,090	19,725	18,688	21,003	24,597	27,364	28,338	31,221	31,562	32,396	30,701	26,817	
Distillate fuel oil	96,849	84,071	80,662	86,222	102,863	120,962	140,388	164,134	174,148	181,840	171,114	151,030	
Residual fuel oil	55,214	54,178	57,210	53,327	55,821	55,479	54,509	57,855	59,429	59,506	58,587	53,261	
Jet fuel	6,257	6,499	7,879	7,842	7,960	7,995	7,995	8,433	7,937	8,044	8,435	8,741	
Lubricating oil	9,494	9,728	9,407	9,170	8,912	8,396	8,402	8,274	8,378	8,237	8,792	8,950	
Wax	714	683	684	715	741	721	701	711	709	697	720	774	
Coke	4,973	5,207	5,471	5,469	5,657	5,892	6,015	5,927	5,816	5,482	5,569	5,705	
Asphalt	11,252	12,726	14,270	15,235	15,351	14,228	12,853	11,409	9,986	9,579	10,224	10,948	
Road oil	414	540	748	1,057	1,317	1,201	1,024	821	665	613	594	653	
Liquefied refinery gases	1,846	1,948	2,090	2,286	2,510	2,615	2,803	2,863	2,966	2,991	2,741	2,520	
Miscellaneous	2,339	2,212	2,509	2,349	2,469	2,282	2,303	2,369	2,196	2,285	2,336	2,281	
Other unfinished oils	68,757	66,187	66,363	70,600	73,683	70,875	72,274	71,621	70,980	70,538	70,611	67,231	
Total 1959 [4]	478,274	474,071	484,593	485,670	507,521	514,088	522,889	547,559	548,900	556,485	551,440	526,026	

[1] New basis; includes stocks located at bulk terminals in Alaska: Gasoline, 244,000 barrels; kerosine, 9,000 barrels; distillate fuel oil, 407,000 barrels; residual fuel oil, 52,000 barrels; jet fuel, 16,000 barrels; and lubricants, 2,000 barrels.

[2] Includes unfinished gasoline.

[3] Old basis; comparable to 1958; that is, excluding Alaska.

[4] New basis; includes Alaska as part of the United States.

Digitized by Google

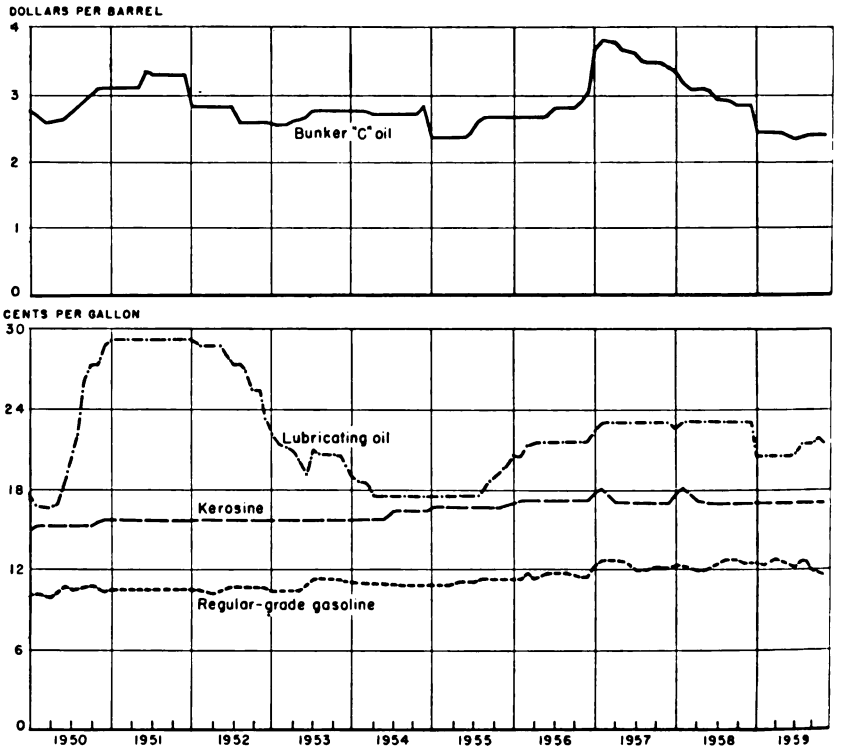

FIGURE 6.—Prices of Bunker "C" oil at New York Harbor, bright stock at Oklahoma refineries, tank-wagon kerosine at Chicago, and Regular-Grade gasoline at refineries in Oklahoma, 1950–59, by months.

Digitized by Google

TABLE 45.—Input and output of petroleum products at refineries in the United States, 1958–59, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Input:													
Crude petroleum	239,376	211,966	229,240	217,138	230,907	226,977	235,396	243,548	233,601	239,449	234,156	247,650	2,789,404
Natural-gas liquids	10,643	9,848	9,942	10,199	10,011	10,420	11,053	12,168	12,606	13,158	13,478	13,743	137,269
Total input	250,019	221,814	239,182	227,337	240,918	237,397	246,449	255,716	246,207	252,607	247,634	261,393	2,926,673
Output:													
Gasoline [1]	118,642	105,467	111,151	106,754	113,726	115,602	124,513	126,531	119,328	120,902	120,832	128,508	1,411,956
Kerosine [2]	11,204	10,651	10,436	8,102	7,036	6,978	6,984	8,202	8,544	9,778	10,500	11,593	110,008
Distillate fuel oil [2]	57,120	48,179	51,149	47,032	50,723	48,342	51,145	52,878	53,506	56,372	54,364	60,595	631,405
Residual fuel oil	33,803	31,054	31,468	28,412	28,537	27,346	30,407	29,789	29,197	29,738	29,361	34,246	363,358
Jet fuel	4,542	4,625	5,697	6,556	6,506	6,480	6,314	6,551	7,061	6,558	5,804	6,982	73,676
Lubricating oil	4,221	3,843	3,973	4,065	4,325	4,224	4,397	4,564	4,162	4,519	4,313	4,692	51,298
Wax [3]	440	389	445	436	425	445	390	422	475	455	474	456	5,252
Coke [3]	3,229	3,802	2,960	3,137	3,323	2,964	3,191	3,187	3,021	3,324	3,237	3,433	37,808
Asphalt [3]	4,047	3,703	4,498	6,603	8,451	9,895	10,189	10,785	10,352	9,384	6,949	4,524	89,380
Road oil	56	156	225	242	756	821	1,116	1,150	765	345	177	116	5,925
Still gas	9,836	8,964	10,108	10,179	10,693	11,113	11,546	11,453	10,769	10,496	10,150	10,644	125,951
Liquefied refinery gases	4,850	4,597	4,694	4,635	4,768	4,715	4,946	4,846	4,691	4,506	4,773	5,602	57,623
Miscellaneous [3]	1,518	1,209	1,531	1,536	1,681	1,377	1,630	1,741	1,646	1,655	1,762	1,432	18,718
Other unfinished oils (net)	[4] 1,477	[4] 2,454	2,712	1,206	1,767	[4] 1,112	[4] 7,840	[4] 3,893	[4] 5,418	[4] 3,670	[4] 2,933	[4] 9,381	[4] 32,493
Shortage or (overage)	(2,012)	(1,371)	(1,865)	(1,558)	(1,799)	(1,793)	(2,479)	(2,490)	(1,892)	(1,755)	(2,129)	(2,049)	(23,192)
Total output	250,019	221,814	239,182	227,337	240,918	237,397	246,449	255,716	246,207	252,607	247,634	261,393	2,926,673
1959 [5]													
Input:													
Crude petroleum	255,124	227,562	254,422	235,982	244,789	239,607	244,316	250,508	236,326	237,066	239,517	252,442	2,917,661
Natural-gas liquids	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323
Total input	267,065	238,676	267,306	247,864	257,127	252,209	257,305	263,770	249,061	250,799	253,161	266,641	3,070,984

See footnotes at end of table.

Digitized by Google

TABLE 45.—Input and output of petroleum products at refineries in the United States, 1958–59—Continued

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Output:													
Gasoline [1]	125,782	110,291	124,944	116,551	122,782	123,876	126,352	129,144	122,167	120,910	121,856	128,775	1,473,430
Kerosine [2]	12,978	11,686	9,484	8,269	7,574	7,314	6,967	7,264	8,305	8,886	9,992	11,943	110,662
Distillate fuel oil [3]	66,124	60,458	61,610	52,181	54,295	53,745	53,279	55,921	52,355	53,816	55,044	60,110	678,938
Residual fuel oil	34,622	31,493	32,569	28,104	27,874	27,448	25,514	27,393	25,581	26,949	29,147	31,206	347,900
Jet fuel	6,112	6,218	7,958	7,154	7,060	7,331	7,974	9,044	8,199	8,788	8,186	8,909	92,933
Lubricating oil	4,360	3,941	4,652	4,751	4,754	4,615	4,958	4,593	4,867	4,934	4,718	4,968	56,111
Wax [3]	499	408	466	506	473	466	430	446	469	454	465	548	5,630
Coke [3]	3,413	3,182	3,679	3,083	3,466	3,620	3,314	3,349	3,425	3,415	3,360	3,811	41,117
Asphalt [3]	4,510	4,379	6,769	7,674	9,281	10,582	11,515	11,406	10,655	9,424	6,626	4,822	97,643
Road oil	62	170	310	523	752	987	1,324	1,044	623	334	164	200	6,493
Still gas	10,313	9,885	10,795	9,985	11,406	11,308	11,713	11,522	10,445	10,238	9,703	10,673	127,086
Liquefied refinery gases	5,171	5,353	6,134	5,861	5,771	5,636	5,657	5,576	5,375	5,538	5,573	6,019	67,664
Miscellaneous [2]	1,818	1,415	1,759	1,782	2,052	1,947	2,009	1,637	1,780	1,812	1,910	1,933	21,854
Other unfinished oils (net)	[4] 5,951	[4] 8,365	[4] 1,694	3,539	2,065	[4] 4,419	[4] 625	[4] 2,040	[4] 1,883	[4] 1,521	[4] 720	[4] 4,254	[4] 25,868
Shortage or (overage)	(2,748)	(1,838)	(2,129)	(2,099)	(2,478)	(2,247)	(3,076)	(2,529)	(3,302)	(3,178)	(2,863)	(3,022)	(31,509)
Total output	267,065	238,676	267,306	247,864	257,127	252,209	257,305	263,770	249,061	250,799	253,161	266,641	3,070,984

[1] Includes unfinished gasoline (net).

[2] Production at natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.

[3] Conversion factors: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.

[4] Negative quantity; represents net excess of unfinished oils rerun over unfinished oil produced.

[5] Preliminary figures.

Digitized by Google

TABLE 46.—Input and output of petroleum products at refineries in the United States, 1958–59, by districts

(Thousand barrels)

	East Coast	Appalachian No. 1	Appalachian No. 2	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, etc.	Oklahoma, Kansas, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas-Louisiana Inland, etc.	New Mexico	Rocky Mountain	West Coast	Total
1958														
Input:														
Crude petroleum	403,278	34,305	36,437	505,182	36,273	259,452	99,376	636,463	243,546	34,857	8,890	97,224	394,121	2,789,404
Natural-gas liquids	2,216	----------	81	12,496	287	13,405	25,051	43,827	11,103	2,031	594	2,246	23,932	137,269
Total input	405,494	34,305	36,518	517,678	36,560	272,857	124,427	680,290	254,649	36,888	9,484	99,470	418,053	2,926,673
Output:														
Gasoline [1]	182,851	14,474	19,084	260,513	17,081	144,520	71,939	325,996	131,564	15,495	4,442	45,914	178,083	1,411,956
Kerosine [2]	10,722	1,385	2,015	24,008	1,935	5,260	3,072	37,340	19,370	2,010	136	1,013	1,742	110,008
Distillate fuel oil [3]	113,982	7,730	6,918	108,092	9,639	63,186	17,417	161,938	53,619	8,010	1,655	21,693	57,526	631,405
Residual fuel oil	66,813	3,001	3,835	57,383	3,999	10,224	7,440	69,805	16,174	2,560	953	11,497	109,674	363,358
Jet fuel	1,151	355	17	5,913	417	12,307	9,978	13,610	5,833	421	1,052	4,859	17,763	73,676
Lubricating oil	6,734	3,525	359	4,266	----------	4,280	3	19,673	5,547	1,560	----------	260	5,091	51,298
Wax [3]	1,614	320	69	239	----------	771	37	1,095	626	----------	----------	67	414	5,252
Coke [3]	4,239	37	385	11,457	1,341	6,072	429	3,013	3,449	1,316	----------	1,604	4,466	37,808
Asphalt [3]	20,002	1,029	2,359	16,273	846	9,433	5,058	6,053	4,724	4,301	540	6,346	12,416	89,380
Road oil	24	35	3	1,564	148	1,232	----------	17	4	14	----------	1,678	1,206	5,925
Still gas	16,089	1,807	2,070	26,642	1,124	11,141	5,790	24,466	8,864	1,375	189	4,507	21,887	125,951
Liquefied refinery gases	7,962	271	105	4,951	701	5,790	3,035	14,477	13,169	692	67	784	5,619	57,623
Miscellaneous [3]	2,840	526	30	1,478	52	1,056	415	4,648	2,656	38	45	357	4,577	18,718
Other unfinished oils (net)	‹ 26,541	‹ 311	34	418	‹ 130	‹ 358	‹ 1,209	1,275	‹ 2,686	‹ 921	10	‹ 330	‹ 1,744	‹ 32,493
Shortage or (overage)	(2,988)	121	(765)	(5,519)	(593)	(2,057)	1,023	(3,116)	(8,264)	17	395	(779)	(667)	(23,192)
Total output	405,494	34,305	36,518	517,678	36,560	272,857	124,427	680,290	254,649	36,888	9,484	99,470	418,053	2,926,673

See footnotes at end of table.

Digitized by Google

TABLE 46.—Input and output of petroleum products at refineries in the United States, 1958–59, by districts—Continued

(Thousand barrels)

	East Coast	Appalachian No. 1	Appalachian No. 2	Indiana, Illinois, Kentucky, etc.	Minnesota, Wisconsin, etc.	Oklahoma, Kansas, etc.	Texas Inland	Texas Gulf Coast	Louisiana Gulf Coast	Arkansas-Louisiana Inland, etc.	New Mexico	Rocky Mountain	West Coast	Total
1959 [4]														
Input:														
Crude petroleum	408,618	34,977	37,440	535,707	38,022	264,586	104,012	673,746	257,714	32,091	8,804	106,038	415,906	2,917,661
Natural-gas liquids	2,238	----------	103	11,982	601	15,296	27,226	49,486	15,182	3,718	928	2,685	23,878	153,323
Total input	410,856	34,977	37,543	547,689	38,623	279,882	131,238	723,232	272,896	35,809	9,732	108,723	439,784	3,070,984
Output:														
Gasoline [1]	187,417	14,743	19,377	275,006	18,285	143,820	76,547	342,495	136,244	14,688	4,728	49,156	190,924	1,473,430
Kerosine [2]	11,765	1,367	2,083	25,342	1,829	4,993	2,965	35,238	20,602	1,518	145	1,196	1,619	110,662
Distillate fuel oil [2]	125,597	7,848	6,893	115,715	9,373	67,287	17,761	169,187	61,528	7,194	1,669	22,700	66,186	678,938
Residual fuel oil	61,657	3,440	4,589	62,311	4,831	9,200	7,714	57,891	18,018	2,211	892	12,512	102,634	347,900
Jet fuel	3,104	205	124	7,098	435	15,454	12,212	17,093	8,616	716	1,210	6,758	19,908	92,933
Lubricating oil	7,754	3,301	506	4,502	----------	4,589	135	21,098	6,695	1,953	----------	209	5,369	56,111
Wax [3]	1,910	335	64	300	----------	628	41	1,120	626	----------	----------	68	538	5,630
Coke [3]	7,611	----------	351	11,608	1,373	5,438	424	3,840	2,763	1,073	----------	1,647	4,899	41,117
Asphalt [3]	20,329	1,231	2,576	17,512	1,208	10,036	5,347	7,076	3,934	4,749	510	6,833	16,302	97,643
Road oil	23	----------	----------	1,652	151	1,386	----------	16	10	18	----------	1,925	1,312	6,493
Still gas	16,648	1,813	1,984	25,821	1,224	10,568	5,203	25,795	7,468	1,215	187	4,543	25,517	127,986
Liquefied refinery gases	8,875	383	127	6,046	675	5,686	2,884	18,935	14,905	780	53	1,223	7,092	67,664
Miscellaneous [2]	3,356	523	27	1,901	65	1,210	688	5,752	3,289	58	30	416	4,539	21,854
Other unfinished oils (net)	‹ 39,189	‹ 376	‹ 287	‹ 545	‹ 49	577	‹ 1,640	24,602	‹ 3,447	‹ 785	2	338	‹ 5,069	‹ 25,868
Shortage or (overage)	(6,001)	164	(871)	(6,670)	(777)	(990)	957	(6,906)	(8,355)	421	306	(801)	(1,986)	(31,509)
Total output	410,856	34,977	37,543	547,689	38,623	279,882	131,238	723,232	272,896	35,809	9,732	108,723	439,784	3,070,984

[1] Includes unfinished gasoline (net).
[2] Production at natural-gasoline plants shown as direct "transfers" and omitted from the input and output at refineries.
[3] Conversion factor: 280 pounds of wax to the barrel; 5.0 barrels of coke to the short ton; 5.5 barrels of asphalt to the short ton.
[4] Negative quantity; represents net excess of unfinished oils rerun over unfinished oils produced.
[5] Preliminary figures.

Digitized by Google

REFINERY CAPACITY

Total crude-oil capacity of petroleum refineries in the United States as of January 1, 1960, was 9,901,424 barrels daily—an increase of installed capacity for the year of 81,578 barrels daily. Two new refineries were reported under construction. One in Hawaii is expected to be onstream during the latter part of 1960; the other, at Rapid River, Mich., is expected to be operating before midyear.

AVIATION GASOLINE

The demand for aviation gasoline declined 8.9 percent in 1959. Domestic demand declined from 81.5 million barrels in 1958 to 76.5 in 1959, and exports dropped from 16.9 million in 1958 to 13.1 million barrels. Refineries reported deliveries to the military of 75,000 barrels a day of aviation-grade gasoline in 1959 compared with 102,000 barrels in 1958.

Jet fuels are not included in aviation gasoline. They are reported as a separate product in another section of this chapter.

TABLE 47.—Petroleum refinery capacity in the United States, January 1, 1955–60

Year	Number of refineries				Crude-oil throughput capacity (barrels per day)				
	Operating	Shut down	Total	Building	Operating	Shut down		Total	Building
						Operable	Inoperable		
1955	296	30	326	4	8,069,154	316,890	34,586	8,420,630	146,800
1956	294	24	318	2	8,380,801	201,835	49,754	8,632,390	267,000
1957	298	21	319	3	8,808,841	262,856	51,977	9,123,674	256,350
1958	288	30	318	2	8,939,907	418,400	49,400	9,407,707	185,265
1959	291	22	313	---	9,450,741	310,705	58,400	9,819,846	108,400
1960	290	20	310	2	9,551,329	299,295	58,800	9,901,424	70,947

Digitized by Google

TABLE 48.—Salient statistics of aviation gasoline in the United States, 1958 total and 1959, by months

(Thousand barrels)

	1959 [1]												1958 total
	January	February	March	April	May	June	July	August	September	October	November	December	Total	
Production, by grades:														
115–145 octane	5,217	4,411	4,068	4,398	3,569	4,471	4,832	4,170	3,840	4,299	4,129	4,878	52,282	56,291
108–135 octane	120	247	276	146	200	204	236	195	150	167	152	109	2,232	3,103
100–130 octane	2,340	1,959	2,498	2,257	2,410	2,312	2,291	2,400	2,420	2,220	2,004	1,917	27,028	29,419
91–98 octane	233	277	263	304	253	271	253	237	265	188	303	199	3,046	3,931
Other grades	262	239	241	375	422	404	428	442	385	402	279	257	4,136	3,754
Alkylate	2,097	2,846	2,499	2,619	3,713	3,166	2,890	3,503	3,126	2,746	2,612	3,107	34,924	26,016
Transfers out [2]	1,948	2,011	2,275	2,744	3,548	3,442	3,752	3,578	3,011	2,904	2,435	3,031	34,679	26,740
Exports	823	1,117	746	1,518	1,408	1,180	1,356	736	1,226	955	954	1,036	13,055	16,856
Stocks, by grades:														
115–145 octane	4,474	4,680	4,853	4,559	4,494	5,090	4,593	4,555	3,780	3,652	3,918	3,942	3,942	[3] 4,091
108–135 octane	308	368	434	313	345	297	255	250	204	232	247	193	193	[3] 329
100–130 octane	3,504	3,442	3,476	3,345	3,223	3,281	3,076	3,177	3,290	3,210	3,189	3,060	3,060	[3] 3,306
91–98 octane	775	813	745	803	768	752	718	700	693	645	723	653	653	[3] 827
Other grades	502	558	528	554	556	567	498	522	538	578	572	556	556	[3] 501
Alkylate	3,623	4,576	4,848	4,834	4,939	4,636	3,747	3,589	3,557	3,398	3,554	3,519	3,519	3,442
Domestic demand, all grades	6,808	5,600	6,377	6,313	5,694	5,908	7,558	6,727	6,680	6,510	5,632	6,680	76,487	81,486
Total demand, [4] by grades:														
115–145 octane	4,800	4,094	3,879	4,642	3,624	3,859	5,203	4,173	4,611	4,408	3,852	4,847	51,992	56,018
108–135 octane	141	184	206	228	167	250	276	188	190	137	166	163	2,296	3,077
100–130 octane	2,140	2,017	2,439	2,364	2,433	2,237	2,483	2,254	2,285	2,235	1,997	2,019	26,903	29,858
91–98 octane	285	236	327	242	284	285	286	254	271	231	219	266	3,186	3,925
Other grades	257	178	262	346	417	393	494	405	366	349	282	270	4,019	3,616
Alkylate	8	8	10	9	177	64	172	189	183	105	70	151	1,146	1,848
Production, by districts:														
District 1	755	881	917	816	996	892	891	977	992	989	600	500	10,206	10,361
District 2	1,407	1,460	1,762	1,548	1,785	2,038	1,810	1,886	1,803	1,665	1,545	1,759	20,468	17,084
District 3	5,841	5,353	5,040	5,502	5,554	5,662	6,017	5,457	5,047	5,213	5,393	6,001	66,080	68,194
District 4	65	70	101	109	115	146	163	141	159	154	88	131	1,442	1,271
District 5	2,201	2,215	2,025	2,124	2,117	2,090	2,049	2,486	2,185	2,001	1,883	2,076	25,452	25,604
Total	10,269	9,979	9,845	10,099	10,567	10,828	10,930	10,947	10,186	10,022	9,509	10,467	123,648	122,514

Digitized by Google

Exports, by districts:													
District 1		1	1	39	67	28	45	43	92	33	12	[3] 98 872	[3] 304 603 9,540	[3] 626 704 11,844 5
District 2	48	23	23	128	45	41	45	37	39	46	30			
District 3	614	897	631	1,004	1,052	894	1,077	411	743	692	653			
District 4												63	2,548	3,587
District 5	161	196	91	347	244	217	189	245	352	184	259			
Total	823	1,117	746	1,518	1,408	1,180	1,356	736	1,226	955	954	1,036	13,055	16,856
Stocks, by districts:														
District 1	1,366	1,611	1,673	1,691	1,696	1,422	1,302	1,172	1,339	1,276	1,227	1,056	1,056	1,371
District 2	2,357	2,427	2,441	2,315	2,160	2,184	2,129	2,179	2,257	2,548	2,551	2,443	2,443	2,529
District 3	6,541	7,330	7,414	7,136	7,017	7,201	6,155	6,051	5,481	5,042	5,405	4,990	4,990	5,940
District 4	92	91	84	99	123	145	154	175	214	258	288	333	333	107
District 5	2,830	2,978	3,272	3,167	3,329	3,671	3,147	3,216	2,771	2,591	2,732	3,101	3,101	[2] 2,549
Total	13,186	14,437	14,884	14,408	14,325	14,623	12,887	12,793	12,062	11,715	12,203	11,923	11,923	[2] 12,496
Shipments [4] originating in—														
District 1	434	235	446	455	508	431	484	448	316	372	370	347	4,846	4,529
District 2	962	827	886	814	812	1,000	870	821	802	616	740	805	9,955	10,329
District 3	4,491	3,880	4,027	4,518	4,150	4,065	5,427	4,172	4,414	4,639	3,909	4,982	52,674	59,523
District 4	73	71	81	95	83	112	127	109	94	109	53	86	1,093	1,082
District 5	1,671	1,704	1,683	1,949	1,549	1,480	2,006	1,913	2,280	1,729	1,514	1,496	20,974	22,879
Total	7,631	6,717	7,123	7,831	7,102	7,088	8,914	7,463	7,906	7,465	6,586	7,716	89,542	98,342

[1] Preliminary figures.
[2] Reject material used as automotive gasoline.
[3] Includes Alaska.
[4] Includes exports.

Digitized by Google

GASOLINE

Total demand for gasoline in 1959 averaged 4,112,000 barrels a day, compared with 4,009,000 barrels in 1958. Domestic demand averaged 4,055,000 barrels daily and exports 57,000 barrels. Imports were 7.2 percent less than in 1958. All figures for aviation gasoline and naphtha are included under total gasoline.

Production.—Gasoline production in 1959 totaled 1,488.1 million barrels—1,320.1 million from crude oil and 168.0 million barrels from natural-gas liquids blended at refineries.

Yields.—Yields of gasoline from crude oil were lower in 1959; the average for the year was 44.9 percent compared with 45.2 percent in 1958. Less unfinished oil, which has a high gasoline content, was processed by refineries in 1959.

Digitized by Google

Statistics of gasoline in the United States, 1957 total and 1958–59 by months
(Thousand barrels)

	1958													
	January	February	March	April	May	June	July	August	September	October	November	December	Total	1957 total
Production:														
Finished gasoline and naphtha from crude oil	108,262	94,405	101,105	96,662	103,484	106,073	113,275	114,139	106,980	106,162	107,212	115,217	1,272,976	1,267,339
Unfinished gasoline (net)	−263	1,214	104	−107	231	−891	185	224	−258	1,582	142	−452	1,711	−2,094
Natural-gas liquids used at refineries	10,643	9,848	9,942	10,199	10,011	10,420	11,053	12,168	12,606	13,158	13,478	13,743	137,269	150,090
Sold to jobbers	2,452	2,160	3,182	2,688	2,830	2,706	3,229	2,537	1,698	1,682	1,222	1,169	27,555	22,805
Total production	121,094	107,627	114,333	109,442	116,556	118,308	127,742	129,068	121,026	122,584	122,054	129,677	1,439,511	1,438,140
Daily average	3,906	3,844	3,688	3,648	3,760	3,944	4,121	4,163	4,034	3,954	4,068	4,183	3,944	3,940
Imports	520	434	700	1,091	1,163	1,809	1,677	1,385	960	865	1,083	2,086	13,773	2,906
Exports	2,198	2,035	1,892	2,432	2,210	1,918	2,612	2,517	2,470	2,410	2,597	2,112	27,403	38,588
Daily average	71	73	61	81	71	64	84	81	82	78	87	68	75	106
Stocks, end of period:														
Finished gasoline	196,855	204,456	207,127	194,869	183,486	175,465	169,709	166,131	164,375	157,576	165,888	174,526	174,526	186,253
Unfinished gasoline	10,260	11,474	11,578	11,471	11,702	10,811	10,996	11,220	10,962	12,544	12,686	12,234	12,234	10,523
Total stocks	207,115	215,930	218,705	206,340	195,188	186,276	180,705	177,351	175,337	170,120	178,574	186,760	186,760	196,776
Domestic demand	109,077	97,211	110,366	120,466	126,661	127,111	132,378	131,290	121,530	126,256	112,086	121,465	1,435,897	1,392,953
Daily average	3,519	3,472	3,560	4,016	4,086	4,237	4,270	4,235	4,051	4,073	3,736	3,918	3,934	3,816

	1959 [1]													1958 total
Production:														
Finished gasoline and naphtha from crude oil	114,472	97,881	110,995	106,079	110,464	110,752	113,880	117,043	109,929	106,561	108,394	114,095	1,320,545	1,272,976
Unfinished gasoline (net)	−631	1,296	1,065	−1,410	−20	522	−517	−1,161	−497	616	−182	481	−438	1,711
Natural-gas liquids used at refineries	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323	137,269
Sold to jobbers	1,726	1,232	1,275	1,554	1,097	704	1,639	1,222	1,177	955	987	1,060	14,628	27,555
Total production	127,508	111,523	126,219	118,105	123,879	124,580	127,991	130,366	123,344	121,865	122,843	129,835	1,488,058	1,439,511
Daily average	4,113	3,983	4,072	3,937	3,996	4,153	4,129	4,205	4,111	3,931	4,095	4,188	4,077	3,944
Imports	858	1,210	2,283	838	417	1,367	422	534	908	830	1,489	1,635	12,791	13,773
Exports	1,575	1,682	1,262	2,243	2,002	1,814	2,056	1,398	1,781	1,688	1,537	1,793	20,831	27,403
Daily average	51	60	41	75	65	60	66	45	59	54	51	58	57	75
Stocks, end of period:														
Finished gasoline	187,472	197,468	204,648	197,841	193,106	183,022	172,755	170,543	163,247	162,780	169,701	175,319	175,319	[2] 174,770
Unfinished gasoline	11,603	12,899	13,964	12,554	12,534	13,056	12,539	11,378	10,881	11,497	11,315	11,796	11,796	12,234
Total stocks	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115	187,115	[2] 187,004
Domestic demand	114,720	99,759	118,995	124,917	127,049	133,695	137,141	132,875	130,264	120,858	116,056	123,578	1,479,907	1,435,897
Daily average	3,701	3,563	3,839	4,164	4,098	4,457	4,424	4,286	4,342	3,899	3,869	3,986	4,055	3,934

[1] Preliminary figures. [2] New basis; includes Alaska. For details of Alaska see table 5.

Digitized by Google

TABLE 50.— Production of gasoline in the United States in 1959,[1] by districts and months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Gasoline from crude oil (excludes net unfinished):													
East Coast	16,786	15,150	16,594	14,539	13,585	14,447	15,857	16,608	15,630	14,338	15,048	15,597	184,179
Appalachian No. 1	1,243	1,166	1,303	940	1,288	1,352	1,308	1,268	1,271	1,210	1,192	1,370	14,911
Appalachian No. 2	1,787	1,582	1,530	1,276	1,569	1,546	1,825	1,802	1,588	1,562	1,610	1,726	19,403
Indiana, Illinois, Kentucky, etc.	21,753	18,554	21,642	20,771	21,755	22,299	21,428	22,887	21,893	21,580	21,165	22,642	258,369
Minnesota, Wisconsin, etc.	1,576	1,407	1,497	1,255	1,464	1,567	1,669	1,506	1,421	930	1,625	1,767	17,684
Oklahoma, Kansas, etc.	11,527	10,248	10,632	9,459	10,975	11,040	10,531	10,935	10,875	10,534	9,756	10,198	126,710
Texas Inland	3,719	3,561	3,584	3,423	3,633	4,011	4,406	4,283	3,881	4,284	4,048	4,300	47,133
Texas Gulf Coast	25,870	18,236	22,954	24,740	26,079	24,117	23,863	24,978	22,098	22,630	22,497	24,788	282,850
Louisiana Gulf Coast	9,533	8,584	10,301	9,717	9,817	10,490	10,893	10,576	10,033	10,082	9,744	9,621	119,391
Arkansas, Louisiana Inland, etc.	878	1,020	1,148	1,097	1,055	983	587	500	872	617	812	1,060	10,629
New Mexico	306	308	322	289	267	289	343	336	283	369	349	330	3,791
Rocky Mountain	4,053	3,559	3,950	3,189	3,180	3,751	4,241	4,336	4,144	3,894	3,823	4,122	46,242
West Coast	13,548	12,996	13,509	13,208	13,479	12,664	14,774	14,960	14,173	12,801	14,583	14,485	165,180
Total gasoline	112,579	96,371	108,966	103,903	108,146	108,556	111,725	114,975	108,162	104,831	106,252	112,006	1,296,472
Naphtha:													
East Coast	103	127	110	190	151	179	142	157	124	134	160	143	1,720
Appalachian No. 1	13	42	26	17	15	16	20	19	20	19	11	3	221
Appalachian No. 2	8	2	15	4	3	8	8	6	3	16	3	2	78
Indiana, Illinois, Kentucky, etc.	239	181	346	337	421	321	423	334	248	215	304	285	3,654
Minnesota, Wisconsin, etc.													
Oklahoma, Kansas, etc.	113	121	161	180	152	232	220	156	142	77	110	121	1,785
Texas Inland	45	19	28	10	15	31	44	37	28	40	39	37	373
Texas Gulf Coast	833	592	818	867	881	770	775	900	899	718	1,019	1,017	10,089
Louisiana Gulf Coast	175	152	200	230	314	257	220	254	131	264	97	154	2,448
Arkansas, Louisiana Inland, etc.	142	63	71	78	67	69	60	51	59	70	57	65	852
New Mexico		7	9	9									25
Rocky Mountain	11	9	28	13	40	13	9	17	26	12	3	27	208
West Coast	211	195	217	241	259	300	234	137	87	165	339	235	2,620
Total naphtha	1,893	1,510	2,029	2,176	2,318	2,196	2,155	2,068	1,767	1,730	2,142	2,089	24,073
Total gasoline and naphtha from crude	114,472	97,881	110,995	106,079	110,464	110,752	113,880	117,043	109,929	106,561	108,394	114,095	1,320,545

Digitized by Google

Unfinished gasoline (net):													
East Coast	−154	249	−258	−220	−312	−30	6	46	−272	−50	1	274	−720
Appalachian No. 1	−24	−54	−38	−5	−62	−10	−62	−8	−38	−11	−33	−44	−389
Appalachian No. 2	−16	−19	−56	−13	−28	−14	−10	−4	−16	4	−18	−17	−207
Indiana, Illinois, Kentucky, etc.	−111	448	598	−164	123	−39	163	−272	−26	−62	53	290	1,001
Minnesota, Wisconsin, etc.	1	−1	1	−1						−1	2	−1	
Oklahoma, Kansas, etc.	−110	−2	137	−225	94	14	63	−143	100	2	14	85	29
Texas Inland	53	203	140	100	239	105	17	234	165	128	240	191	1,815
Texas Gulf Coast	49	390	830	−457	−208	48	−494	−499	262	153	62	−66	70
Louisiana Gulf Coast	−274	−131	−6	−106	57	−13	−113	−198	31	−16	7	−15	−777
Arkansas, Louisiana Inland, etc.	72	14	−28	−12	39	−27	−16	7	−216	−186	−126	−32	−511
New Mexico	−5	−5		1	−2	−3	−1	−1		−4		4	−16
Rocky Mountain	−51	88	−17	−72	58	−26	45	−5	−22	49	19	−45	21
West Coast	−61	116	−238	−236	−18	517	−115	−318	−465	610	−403	−143	−754
Total unfinished gasoline (net)	−631	1,296	1,065	−1,410	−20	522	−517	−1,161	−497	616	−182	481	−438
Percentage yield of gasoline and naphtha [2]	43.6	42.0	43.8	45.0	45.5	45.6	46.3	45.9	45.9	44.9	45.1	44.6	44.9
Natural-gas liquids blended at refineries	11,941	11,114	12,884	11,882	12,338	12,602	12,989	13,262	12,735	13,733	13,644	14,199	153,323
Total refinery production:													
East Coast	17,077	15,737	16,571	14,679	13,570	14,712	16,182	16,983	15,596	14,560	15,476	16,274	187,417
Appalachian No. 1	1,232	1,154	1,291	952	1,241	1,358	1,266	1,279	1,253	1,218	1,170	1,329	14,743
Appalachian No. 2	1,779	1,565	1,489	1,270	1,557	1,562	1,844	1,824	1,588	1,593	1,595	1,711	19,377
Indiana, Illinois, Kentucky, etc.	22,906	19,999	23,533	21,687	23,056	23,336	22,862	23,933	23,261	22,917	22,759	24,757	275,006
Minnesota, Wisconsin, etc.	1,624	1,455	1,549	1,301	1,499	1,602	1,718	1,571	1,489	966	1,685	1,826	18,285
Oklahoma, Kansas, etc.	12,897	11,743	12,271	10,600	12,280	12,519	11,990	12,194	12,361	11,953	11,185	11,827	143,820
Texas Inland	5,701	5,493	6,212	5,785	6,327	6,780	7,120	7,028	6,531	6,586	6,433	6,551	76,547
Texas Gulf Coast	30,356	22,621	28,698	28,987	30,811	28,962	28,341	29,709	27,352	28,218	28,056	30,384	342,495
Louisiana Gulf Coast	10,650	9,844	11,755	10,912	11,388	11,897	12,251	11,934	11,333	11,733	11,295	11,252	136,244
Arkansas, Louisiana Inland, etc.	1,405	1,432	1,524	1,471	1,497	1,333	882	846	1,006	800	1,045	1,447	14,688
New Mexico	350	347	387	355	337	369	426	437	365	455	458	442	4,728
Rocky Mountain	4,228	3,835	4,173	3,303	3,489	3,942	4,490	4,595	4,378	4,190	4,134	4,399	49,156
West Coast	15,577	15,066	15,491	15,249	15,730	15,504	16,980	16,811	15,654	15,721	16,565	16,576	190,924
Total 1959	125,782	110,291	124,944	116,551	122,782	123,876	126,352	129,144	122,167	120,910	121,856	128,775	1,473,430
Natural-gas liquids used in other gasoline blends [3]	1,726	1,232	1,275	1,554	1,097	704	1,639	1,222	1,177	955	987	1,060	14,628
Total gasoline production	127,508	111,523	126,219	118,105	123,879	124,580	127,991	130,366	123,344	121,865	122,843	129,835	1,488,058

[1] Preliminary figures.
[2] Based on crude runs to stills adjusted for net stocks of unfinished oils.
[3] This represents a net figure and includes exports.

Digitized by Google

Domestic Demand.—Domestic demand for gasoline and naphtha (1,479.9 million barrels) was 3.1 percent higher than in 1958. Included in this demand were about 1.9 million barrels for Alaska, which in former years had been treated as exports. Civilian highway use of gasoline, as computed from data compiled by the Bureau of Public Roads, accounted for 1,287 million barrels or 87.1 percent of the total domestic demand in 1959, compared with 85.5 percent in 1958. Aviation gasoline represented 5.2 percent of the demand. The balance, 114.5 million barrels or 7.7 percent, was considered as used for nonhighway motor vehicles, military motor vehicles, and stationary and marine engines and as losses.

Production and Consumption by States.—Table 51 shows gasoline production, consumption by PAD districts, and interdistrict shipments which balance the supply for each district. Consumption data compiled by (API), exclude commercial naphthas and off-shore military shipments. For comparative purposes naphtha production has been excluded from the table. No breakdown by districts is available on the 27.5 million barrels of natural-gas liquids that were blended with gasoline at terminal facilities away from the refineries in 1959; therefore, it has been omitted from the production figures. This roughly offsets the omission of offshore military shipments in the consumption data.

Method of Distribution.—Gasoline deliveries by pipeline totaled 709.1 million barrels in 1959, or 69 percent of the total volume transported by product pipelines. Tidewater shipments of gasoline to the Atlantic Seaboard States amounted to 230.3 million barrels (229.2 million

TABLE 51.—Consumption, production, and distribution [1] of gasoline in 1959, by PAD districts

(Million barrels)

	PAD Districts					
	1	2	3	4	5	Total
Consumption [2]	500.5	520.2	196.2	43.4	202.0	1,462.3
Supply:						
Production [3]	200.2	451.0	560.9	48.9	188.3	1,449.3
Imports	8.9	.4	.1		3.4	12.8
Received from other districts:						
From District 1		3.6				
From District 2	5.9		15.5	.4		
From District 3	284.5	90.9		3.6	7.8	
From District 4		1.0			6.3	
From District 5	1.1			.5		
Total receipts	291.5	95.5	15.5	4.5	14.1	
Total supply	500.6	546.9	576.5	53.4	205.8	1,462.1
Stock change	−2.0	+3.1	−3.3	+.5	+1.8	+.1
Shipped to other districts	3.6	21.8	386.8	7.3	1.6	
Domestic demand	499.0	522.0	193.0	45.6	202.4	1,462.0
Difference between consumption and demand	+1.5	−1.8	+3.2	−2.2	−.4	+.3

[1] Apparent distribution of gasoline by districts is based on actual data on tidewater and river shipments compiled by the Geological Survey, U.S. Department of the Interior. An estimate of annual interdistrict railroad shipments was computed from January–September 1959 data compiled by the Bureau of Transport Economics and Statistics, Interstate Commerce Commission. Interdistrict pipeline shipments are compiled by the Bureau of Mines. As information on shipments moving from PAD District 2 by way of Great Lakes ports and the Ohio River from PAD District 1 were not available for 1959, an estimate has been made for these shipments based on previous year's data.

[2] Compiled by API.

[3] Excludes naphtha production and gasoline blended at terminal facilities.

Digitized by Google

TABLE 52.—Production (refinery output) and consumption of gasoline in the United States, 1957–59, by States

(Thousand barrels)

	1957		1958		1959 [1]	
	Production [2]	Consumption [3]	Production [2]	Consumption [3]	Production [2]	Consumption [3]
Alabama	(4)	21,696	(4)	22,517	(4)	23,677
Alaska		(5)		(5)		1,924
Arizona		9,996		10,773		11,642
Arkansas	11,399	13,039	11,158	13,565	9,181	14,145
California	[6] 183,980	130,041	[6] 178,083	136,738	[6] 190,924	141,537
Colorado	5,303	15,782	5,564	16,289	6,016	16,983
Connecticut		17,277		17,593		18,271
Delaware	(7)	4,398	(7)	4,463	(7)	4,853
District of Columbia		4,715		4,716		4,934
Florida		39,860		41,955		44,754
Georgia	(8)	28,452		29,354		30,907
Idaho		6,192		6,462		6,681
Illinois	99,437	69,283	104,299	70,261	107,604	72,221
Indiana	68,463	40,951	69,340	40,715	72,919	42,777
Iowa		26,831		27,994		28,378
Kansas	56,511	24,642	56,752	24,772	59,131	25,197
Kentucky	[9] 14,877	20,583	[9] 15,086	20,746	[9] 16,975	21,643
Louisiana	[4] 128,381	21,651	[4] 135,901	22,392	[4] 141,751	22,987
Maine		7,465		7,636		7,909
Maryland	(8)	19,886	(8)	20,484	(8)	21,505
Massachusetts	[7] 21,086	31,569	[7] 22,668	32,252	[7] 27,258	33,935
Michigan	19,525	61,069	18,294	61,362	19,908	63,610
Minnesota	8,423	29,517	8,921	31,059	9,021	31,618
Mississippi	(4)	14,391	(4)	14,809	(4)	15,789
Missouri	[10] 12,967	38,176	[10] 14,993	39,291	[10] 11,099	41,271
Montana	9,856	6,906	9,518	6,966	10,452	7,302
Nebraska	(10)	13,844	(10)	14,214	(10)	14,720
Nevada		3,221		3,285		3,588
New Hampshire		4,692		4,694		4,830
New Jersey	54,220	44,054	59,162	45,417	61,328	47,802
New Mexico	5,081	9,642	4,442	10,573	4,728	10,295
New York	15,220	93,428	14,040	95,255	13,011	97,949
North Carolina		31,817		32,587		34,805
North Dakota	[11] 8,059	7,482	[11] 8,160	7,646	[11] 9,264	7,280
Ohio	73,645	74,502	72,578	74,309	76,977	77,424
Oklahoma	74,421	22,372	72,775	23,991	73,590	26,008
Oregon		15,086		15,376		16,065
Pennsylvania	93,139	74,133	94,396	75,604	93,109	77,571
Rhode Island	(7)	5,769	(7)	5,861	(7)	5,924
South Carolina	(8)	16,039	(8)	16,436	(8)	17,400
South Dakota		7,983		8,163		8,276
Tennessee	(9)	25,353	(9)	26,392	(9)	28,279
Texas	407,093	105,079	397,935	112,030	419,042	109,275
Utah	15,678	7,444	14,573	7,782	15,068	8,203
Vermont		2,947		3,006		3,127
Virginia	[6] 10,922	29,524	[6] 6,306	30,098	[6] 6,621	31,484
Washington	(6)	22,714	(6)	24,047	(6)	27,200
West Virginia	839	11,959	753	11,830	833	12,560
Wisconsin	(11)	29,604	(11)	30,640	(11)	31,529
Wyoming	16,810	3,983	16,259	4,036	17,620	4,262
Total	1,415,335	1,367,039	1,411,956	1,408,436	1,473,430	1,462,306

[1] Preliminary figures.
[2] Excludes jet fuel.
[3] API.
[4] Alabama and Mississippi included with Louisiana.
[5] Not a State before 1959.
[6] Washington included with California.
[7] Delaware and Rhode Island included with Massachusetts.
[8] Maryland, South Carolina, and Georgia (1957) included with Virginia.
[9] Tennessee included with Kentucky.
[10] Nebraska included with Missouri.
[11] Wisconsin included with North Dakota.

Digitized by Google

from the gulf coast and 1.1 million barrels from the west coast). Interdistrict barge shipments from the Gulf Coast States up the Mississippi River were 56.3 million barrels in 1959. The West Coast States received 14.1 million barrels of gasoline from the other States in 1959 (1.6 million by way of the Panama Canal, 11.8 million by pipeline, and the rest by rail). Data on intradistrict shipments of gasoline are not available, but the volume is presumed to be large.

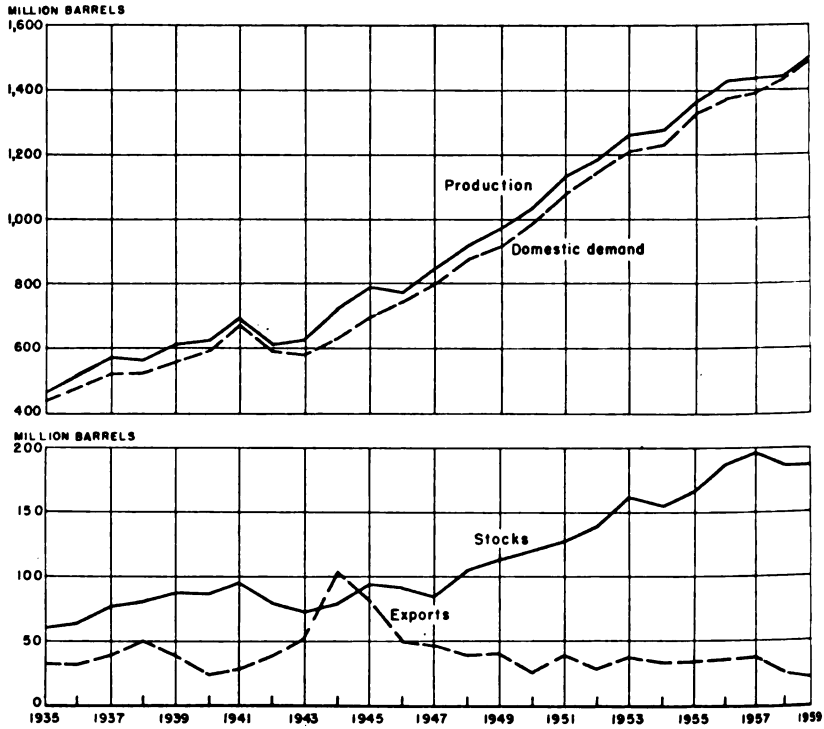

FIGURE 7.—Production, domestic demand, exports, and stocks of gasoline in the United States, 1935–59.

Digitized by Google

TABLE 53.—Transportation of petroleum products by pipeline in 1958–59, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Turned into lines: [1]													
Gasoline	51,433	45,087	53,616	53,603	56,206	58,355	58,493	58,928	55,712	56,781	55,339	55,381	658,934
Kerosine	5,581	4,723	4,423	3,141	2,579	1,828	2,756	3,156	3,272	4,265	4,013	6,338	46,075
Distillate fuel oil	23,478	19,895	17,931	13,329	11,986	13,264	14,045	14,474	15,946	16,282	17,965	26,356	204,951
Liquefied petroleum gases	2,634	2,357	2,437	2,158	2,266	2,442	3,022	2,727	3,397	3,226	3,111	4,564	34,341
Delivered from lines: [1]													
Gasoline	49,922	43,711	52,955	53,073	56,912	58,585	58,808	59,035	56,505	57,956	54,768	56,415	658,645
Kerosine	5,847	5,243	4,243	3,094	2,405	1,832	2,231	2,823	3,024	3,961	4,363	5,970	45,036
Distillate fuel oil	24,881	22,698	18,893	13,618	11,113	11,598	12,523	13,085	14,257	16,004	17,577	28,381	204,628
Liquefied petroleum gases	2,630	2,474	2,561	2,154	2,205	2,334	2,961	2,565	3,273	2,622	3,142	4,505	33,426
Shortage (or overage): [2]													
Gasoline	(34)	14	(520)	(109)	(16)	(47)	(38)	1	(41)	(34)	(90)	43	(871)
Kerosine	104	104	94	75	69	58	65	84	67	76	103	85	984
Distillate fuel oil	71	58	101	81	79	83	101	108	96	114	91	(41)	942
Liquefied petroleum gases	58	51	58	38	44	13	40	42	23	52	53	50	522
Stocks in lines and working tanks at end of month:													
Gasoline	22,415	23,777	24,958	25,597	24,907	24,724	24,447	24,339	23,587	22,446	23,107	22,030	22,030
Kerosine	2,202	1,578	1,664	1,636	1,741	1,679	2,139	2,388	2,569	2,797	2,344	2,627	2,627
Distillate fuel oil	12,102	9,241	8,178	7,808	8,602	10,185	11,606	12,887	14,480	14,644	14,941	12,957	12,957
Liquefied petroleum gases	1,487	1,319	1,137	1,103	1,120	1,215	1,236	1,356	1,457	2,009	1,925	1,934	1,934
1959													
Turned into lines: [1]													
Gasoline	55,426	48,538	59,909	58,574	61,790	62,615	64,456	63,481	60,595	59,957	56,069	57,656	709,066
Kerosine	5,827	4,923	3,980	3,283	2,489	2,655	2,469	2,997	4,003	4,872	5,149	5,893	48,540
Distillate fuel oil	27,523	22,686	19,467	15,841	13,649	14,833	15,287	15,496	16,669	18,468	21,923	27,482	229,324
Liquefied petroleum gases	3,844	3,205	2,957	2,761	2,845	2,733	3,070	3,125	3,164	3,805	4,230	4,677	40,416
Delivered from lines: [1]													
Gasoline	53,947	48,047	56,911	59,029	61,985	63,439	64,809	64,640	61,824	59,626	56,384	57,577	708,218
Kerosine	6,616	4,909	3,928	3,211	2,283	2,264	2,503	2,695	3,545	4,560	5,128	6,050	47,692
Distillate fuel oil	29,322	24,803	20,572	15,167	12,840	13,008	13,581	12,426	15,897	17,979	22,249	27,713	225,557
Liquefied petroleum gases	4,018	3,235	3,011	2,796	2,799	2,686	2,926	3,130	3,073	3,741	4,174	4,651	40,240
Shortage (or overage): [2]													
Gasoline	(57)	(26)	(24)	41	15	1	(10)	104	62	(45)	86	(64)	83
Kerosine	110	111	89	96	75	69	77	68	77	105	139	122	1,138
Distillate fuel oil	(55)	(44)	(21)	(37)	3	(1)	3	20	22	(95)	54	----------	(151)
Liquefied petroleum gases	56	(17)	72	18	(2)	21	12	14	37	84	32	67	394
Stocks in lines and working tanks at end of month:													
Gasoline	23,566	24,083	27,105	26,609	26,399	25,574	25,231	23,968	22,677	23,053	22,652	22,795	22,795
Kerosine	1,728	1,631	1,594	1,570	1,701	2,023	1,912	2,146	2,527	2,734	2,616	2,337	2,337
Distillate fuel oil	11,213	9,140	8,056	8,767	9,573	11,399	13,102	16,152	16,902	17,486	17,106	16,875	16,875
Liquefied petroleum gases	1,704	1,691	1,565	1,512	1,560	1,586	1,718	1,699	1,753	1,733	1,757	1,716	1,716

[1] The quantities "Turned into lines" and "Delivered from lines" are on a net basis, eliminating intersystem transfers.

[2] Figures in parentheses represent overage.

Digitized by Google

TABLE 54.—Transportation of petroleum products by pipeline between PAD districts in the United States in 1958–59, by months

(Thousand barrels)

	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
From District 1 to District 2:													
Gasoline	371	280	263	379	125	343	271	234	308	339	257	199	3,369
Kerosine	9	8	18	5		21	8	13			2		84
Distillate fuel oil	45	35	30	20	46	22	27	13		21	21	32	312
From District 2 to District 3:													
Gasoline	1,164	911	1,036	860	1,212	1,422	1,087	1,179	931	941	1,078	1,059	12,880
Kerosine													
Distillate fuel oil	479	401	147	254	137	129	217	201	441	452	664	716	4,238
From District 3 to District 1:													
Gasoline	3,408	2,834	4,024	3,686	4,038	4,075	3,779	4,095	3,952	4,070	4,023	3,829	45,813
Kerosine	1,235	1,493	764	622	437	372	381	732	651	1,082	1,079	1,248	10,096
Distillate fuel oil	1,312	1,395	1,537	1,100	693	696	909	1,019	1,198	1,164	1,007	1,382	13,412
From District 3 to District 2:													
Gasoline	2,360	2,336	3,467	3,362	3,192	2,876	3,237	2,975	2,777	3,072	3,101	2,887	35,642
Kerosine	181	171	115	89	85	27	50	80	200	195	151	169	1,513
Distillate fuel oil	1,236	737	701	732	429	422	503	814	728	773	628	1,049	8,752
From District 3 to District 4:													
Gasoline	251	244	186	210	227	306	308	214	258	255	235	229	2,923
Kerosine	24	16	12	16	24	1	1		8	46		1	149
Distillate fuel oil	18	19	30	27	26	26	26	35	35	38	40	43	363
From District 3 to District 5:													
Gasoline	401	368	378	385	379	351	431	447	403	412	483	545	4,983
Kerosine [1]	157	152	163	191	242	191	212	146	228	60	1	1	1,744
Distillate fuel oil	57	43	55	53	58	38	52	42	42	53	50	55	598
From District 4 to District 5:													
Gasoline	517	509	465	480	422	499	513	426	603	429	424	520	5,807
Kerosine [1]	143	56	172	91	76	90	124	79	98	83	178	142	1,338
Distillate fuel oil	380	281	218	186	156	126	223	213	198	304	254	366	2,905

Digitized by Google

1959													
From District 1 to District 2:													
Gasoline	230	314	413	351	297	195	229	201	226	273	327	314	3,370
Kerosine	3	9	4	5									21
Distillate fuel oil	18	18	13	10			30						89
From District 2 to District 3:													
Gasoline	1,011	1,080	1,272	1,315	966	1,220	1,292	1,187	1,360	1,167	1,088	1,162	14,120
Kerosine	1									1	1		3
Distillate fuel oil	660	359	358	257	125	158	178	321	433	675	599	648	4,771
From District 3 to District 1:													
Gasoline	3,668	3,834	3,986	3,804	4,326	4,082	4,275	4,372	4,262	4,359	4,157	4,056	49,181
Kerosine	1,466	752	531	433	149	311	349	588	850	1,041	1,015	1,244	8,729
Distillate fuel oil	1,569	1,655	984	774	692	795	1,066	1,246	1,209	1,062	1,041	1,506	13,599
From District 3 to District 2:													
Gasoline	2,299	2,259	3,457	2,748	3,333	3,212	3,536	3,269	3,125	3,522	4,034	3,495	38,289
Kerosine	217	143	62	49	67	79	42	32	70	484	366	347	1,958
Distillate fuel oil	1,184	968	588	445	435	487	552	856	1,061	2,030	847	1,936	11,389
From District 3 to District 4:													
Gasoline	369	196	250	222	314	266	282	343	448	423	225	252	3,590
Kerosine	1	1	11	1	1			1	1	2	36	41	96
Distillate fuel oil	68	36	36	41	47	40	48	42	74	99	27	30	588
From District 3 to District 5:													
Gasoline	488	444	517	438	439	537	458	395	478	519	501	553	5,767
Kerosine [1]	325	345	312	325	256	272	261	258	242	352	243	267	3,458
Distillate fuel oil	77	51	75	55	56	70	55	40	52	47	63	57	698
From District 4 to District 5:													
Gasoline	484	462	484	545	485	611	525	453	524	490	476	486	6,025
Kerosine [1]	110	153	269	313	127	210	277	353	272	241	141	201	2,667
Distillate fuel oil	328	272	372	257	251	153	194	191	327	383	438	450	3,616

[1] Jet fuel.

Digitized by Google

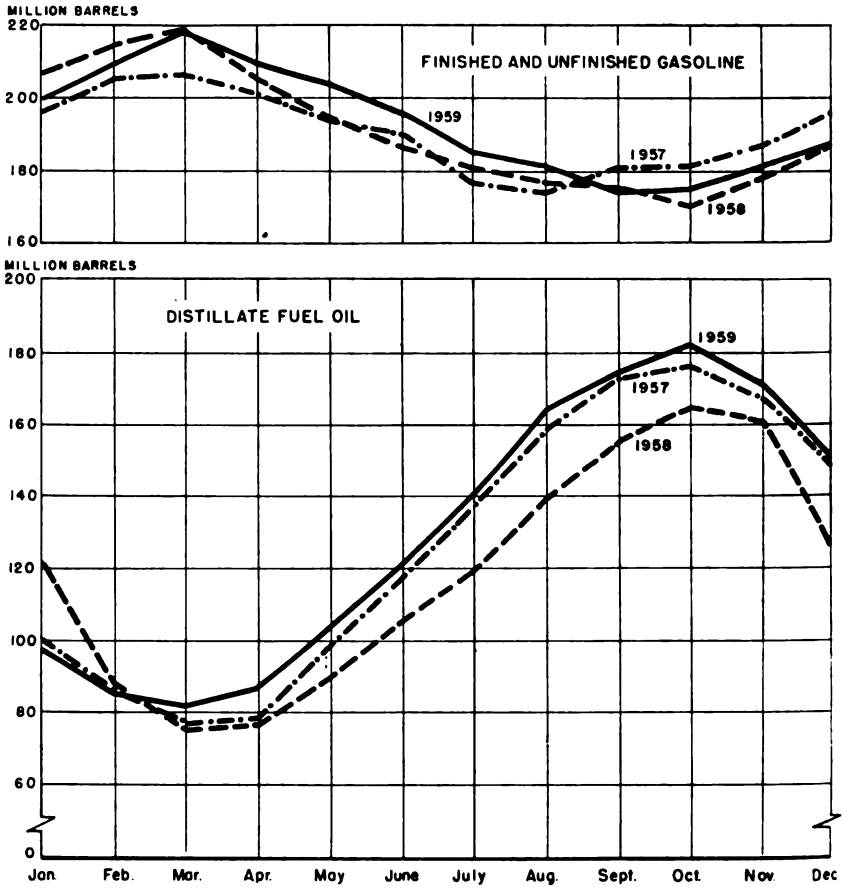

FIGURE 8.—Stocks of finished and unfinished gasoline and stocks of distillate fuel oil in the United States, 1957–1959, by months.

Digitized by Google

Stocks.—Stocks of finished gasoline, as reported, include those held at refineries, in pipelines, and at bulk terminals operated by refining and pipeline companies but do not include those held by secondary distributors, by consumers, or in military custody. The Bureau of Mines definition of a bulk-terminal installation is any storage facility that receives its principal products by tanker, barge, or pipeline or any storage point with a combined capacity for storing gasoline, kerosine, distillate fuel oil, residual fuel oil, or jet fuels of 50,000 barrels or more, regardless of transportation means by which products are received.

There are definite normal seasonal variations in gasoline storage because of a summer peak and a winter low in gasoline demand. These stocks build up in the winter, although refinery yields are lower, and decrease sharply during the summer. This variation in stocks makes unnecessary large variations in seasonal yields of gasoline from crude oil. Distillate fuel oil follows the exact reverse of this pattern, as demand is high in winter and low in summer.

Total stocks of gasoline at the end of 1959 were 187,115,000 barrels, an increase of 111,000 barrels for the year. The estimated supply of finished and unfinished gasoline at yearend was 51.8 days compared with 49.9 days on December 31, 1958.

Digitized by Google

TABLE 55.—Stocks of gasoline in the United States in 1959, by districts and months

(Thousand barrels)

	Jan. 31	Feb. 28	Mar. 31	Apr. 30	May 31	June 30	July 31	Aug. 31	Sept. 30	Oct. 31	Nov. 30	Dec. 31
Finished gasoline: [1]												
East Coast	40,545	44,442	46,600	48,049	45,001	43,702	42,040	42,479	40,528	39,076	38,796	39,188
Appalachian No. 1	4,517	4,584	5,519	5,141	5,126	5,164	5,498	5,598	5,125	5,385	5,523	5,515
Appalachian No. 2	2,671	2,747	2,554	2,423	2,658	2,582	2,685	2,741	2,550	2,808	2,679	2,800
Indiana, Illinois, Kentucky, etc	33,543	35,255	37,629	36,392	34,192	32,853	29,802	30,217	29,173	28,227	28,199	30,361
Minnesota, Wisconsin, North Dakota, and South Dakota	6,566	6,502	6,600	6,384	6,614	6,302	5,963	6,343	6,182	6,663	7,305	7,413
Oklahoma, Kansas, etc	19,952	21,568	21,601	19,659	19,709	18,143	17,053	15,102	14,768	15,377	16,506	16,753
Texas Inland	7,715	8,073	7,521	7,225	6,995	6,529	6,580	6,985	6,507	6,765	6,557	6,969
Texas Gulf Coast	24,137	23,918	24,837	22,763	23,865	21,799	19,170	18,107	17,101	17,495	19,303	20,356
Louisiana Gulf Coast	11,381	10,656	11,358	10,976	10,767	9,926	9,754	9,401	8,731	8,680	9,831	9,088
Arkansas, Louisiana Inland, etc	5,673	6,198	5,234	4,986	4,342	4,532	3,960	4,465	4,673	4,876	4,751	4,780
New Mexico	736	794	781	715	735	617	636	687	609	695	813	769
Other Rocky Mountain	6,022	6,738	7,219	6,607	5,990	5,214	4,565	4,248	4,068	4,289	4,818	5,711
West Coast	24,014	25,993	27,195	26,521	27,112	25,659	25,049	24,170	23,232	22,444	24,620	25,616
Total finished gasoline	187,472	197,468	204,648	197,841	193,106	183,022	172,755	170,543	163,247	162,780	169,701	[2] 175,319
Unfinished gasoline:												
East Coast	1,829	2,071	2,005	1,807	1,530	1,498	1,514	1,624	1,350	1,321	1,308	1,590
Appalachian No. 1	186	163	176	216	230	267	229	244	227	248	229	210
Appalachian No. 2	42	32	44	32	9	44	43	53	37	44	42	45
Indiana, Illinois, Kentucky, etc	1,540	1,948	2,427	2,217	2,259	2,124	2,254	1,945	1,898	1,801	1,824	2,069
Minnesota, Wisconsin, North Dakota, and South Dakota	2	1	2	1	1	1	1	1	1		2	1
Oklahoma, Kansas, etc	595	593	730	505	599	613	676	533	633	635	649	734
Texas Inland	263	359	379	378	452	398	289	346	367	306	344	267
Texas Gulf Coast	3,471	3,949	4,662	4,266	4,159	4,340	3,903	3,418	3,632	3,724	3,807	3,869
Louisiana Gulf Coast	686	581	620	532	617	632	578	431	493	530	586	648
Arkansas, Louisiana Inland, etc	106	120	92	80	120	93	77	132	79	69	89	112
New Mexico	10	10	12	13	11	9	8	7	7	3	5	9
Other Rocky Mountain	157	240	221	149	207	180	225	220	198	247	264	219
West Coast	2,716	2,832	2,594	2,358	2,340	2,857	2,742	2,424	1,959	2,569	2,166	2,023
Total unfinished gasoline	11,603	12,899	13,964	12,554	12,534	13,056	12,539	11,378	10,881	11,497	11,315	11,796
Total finished and unfinished gasoline:												
East Coast	42,374	46,513	48,605	49,856	46,531	45,200	43,554	44,103	41,878	40,397	40,104	40,778
Appalachian No. 1	4,703	4,747	5,695	5,357	5,356	5,431	5,727	5,842	5,352	5,633	5,752	5,725
Appalachian No. 2	2,713	2,779	2,598	2,455	2,667	2,626	2,728	2,794	2,587	2,852	2,721	2,845
Indiana, Illinois, Kentucky, etc	35,083	37,203	40,056	38,609	36,451	34,977	32,056	32,162	31,071	30,028	30,023	32,430
Minnesota, Wisconsin, North Dakota, and South Dakota	6,568	6,503	6,602	6,385	6,615	6,303	5,964	6,344	6,183	6,663	7,307	7,414
Oklahoma, Kansas, etc	20,547	22,161	22,331	20,164	20,308	18,756	17,729	15,635	15,401	16,012	17,155	17,487

Digitized by Google

Texas Inland	7,978	8,432	7,900	7,603	7,447	6,927	6,869	7,331	6,874	7,071	6,901	7,236
Texas Gulf Coast	27,608	27,867	29,499	27,029	28,024	26,139	23,073	21,525	20,733	21,219	23,110	24,225
Louisiana Gulf Coast	12,067	11,237	11,978	11,508	11,384	10,558	10,332	9,832	9,224	9,210	10,417	9,736
Arkansas, Louisiana Inland, etc	5,779	6,318	5,326	5,066	4,462	4,625	4,037	4,597	4,752	4,945	4,840	4,892
New Mexico	746	804	793	728	746	626	644	694	616	698	818	778
Other Rocky Mountain	6,179	6,978	7,440	6,756	6,197	5,394	4,790	4,468	4,266	4,536	5,082	5,930
West Coast	26,730	28,825	29,789	28,879	29,452	28,516	27,791	26,594	25,191	25,013	26,786	27,639
Total: 1959	199,075	210,367	218,612	210,395	205,640	196,078	185,294	181,921	174,128	174,277	181,016	187,115
1958	207,115	215,930	218,705	206,340	195,188	186,276	180,705	177,351	175,337	170,120	178,574	[3] 186,760

[1] Includes stocks of finished gasoline at refineries and bulk terminals and in pipelines.
[2] Includes 3,938,000 barrels of naphtha.
[3] Does not include 244,000 barrels located at bulk terminals in Alaska.

Digitized by Google

TABLE 56.—Day's supply of gasoline on hand in the United States at end of month, 1958–59 [1]

	1957	1958	1959 [2]		1957	1958	1959 [2]
January	54.9	58.4	54.9	July	41.7	41.8	42.8
February	54.3	60.7	54.2	August	44.7	42.9	41.3
March	52.3	53.4	51.6	September	45.9	42.2	44.0
April	49.1	49.6	50.5	October	49.3	45.0	44.5
May	47.0	45.4	45.5	November	50.6	44.8	44.8
June	44.4	42.8	43.7	December	55.8	49.9	51.8

[1] Stocks divided by daily average total demand (domestic demand plus exports) for succeeding month.
[2] Preliminary figures.

Prices.—The dealer's average net price for Regular Grade gasoline (exclusive of dealer's margin and sales tax) in 55 representative cities in the United States provides an index of wholesale gasoline prices. The average service station price (excluding taxes) decreased from 21.47 cents per gallon in 1958 to 21.18 cents in 1959. The average tax on gasoline (including Federal, State, and local taxes) was 9.31 cents per gallon in 1959, compared with 8.91 cents in 1958.

TABLE 57.—Average monthly prices of gasoline in the United States, 1958–59, in cents per gallon

	Jan.	Feb.	Mar.	Apr.	May	June	July
1958							
Monthly average at refineries in Oklahoma, regular, 89 octane [1]	12.38	12.28	12.15	12.00	12.00	12.25	12.57
Average of 55 cities on 1st of month: [2]							
Dealer's net (excluding tax)	16.55	15.94	16.56	16.39	16.13	16.07	15.97
Service station (including State, local, and Federal taxes)	30.61	30.02	30.65	30.46	30.37	30.35	30.31
1959							
Monthly average at refineries in Oklahoma, regular, 91 octane [1] [3]	12.48	12.38	12.57	12.75	12.63	12.32	12.08
Average of 55 cities on 1st of month: [2]							
Dealer's net (excluding tax)	15.79	15.95	15.83	16.31	16.10	16.13	16.06
Service station (including State, local, and Federal taxes)	29.51	29.89	30.06	30.32	30.17	30.26	30.44

	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1958						
Monthly average at refineries in Oklahoma, regular, 89 octane [1]	12.88	12.88	12.76	12.50	12.50	12.43
Average of 55 cities on 1st of month: [2]						
Dealer's net (excluding tax)	16.65	16.64	16.16	16.08	15.55	16.22
Service station (including State, local, and Federal taxes)	31.12	30.99	30.44	29.99	29.30	30.38
1959						
Monthly average at refineries in Oklahoma, regular, 91 octane [1] [3]	12.62	12.55	12.00	11.86	11.56	12.32
Average of 55 cities on 1st of month: [2]						
Dealer's net (excluding tax)	16.35	16.48	16.39	15.78	16.05	16.09
Service station (including State, local, and Federal taxes)	30.83	30.91	31.49	30.82	31.20	30.49

[1] Platt's Oil Price Handbook.
[2] Platt's Oilgram Price Service.
[3] 89 octane Regular-Grade gasoline before July 1.

Digitized by Google

KEROSINE

The total demand for kerosine declined 3 percent in 1959 to 111 million barrels. Domestic demand was 2.9 percent less and exports 13.1 percent less than in 1958. The decline in normal uses offset the increased use of kerosine for fuel in commercial jet and turboprop aircraft. Most commercial jet or turboprop engines use straight kerosine for fuel.

Because the end use of a product is not known when it is delivered from the refinery, kerosine used for aircraft fuel sometimes is reported to the Bureau of Mines as a delivery of kerosine and at other times as a delivery of jet fuel. To effect a more uniform method of reporting, the Bureau has requested refiners to report all deliveries of kerosine used for aircraft fuel in 1960 under kerosine and designate, by footnote, the deliveries for aircraft use when known.

Production of kerosine at refineries and natural-gas-liquids plants in 1959 totaled 111.7 million barrels, a 0.3-percent increase over 1958.

The average posted price for kerosine at Oklahoma refineries increased from 10.03 cents per gallon in 1958 to 10.29 cents in 1959. The tank-wagon price at Chicago held steady for the year, but in the New York area the average for the year was 0.6 cent higher.

Pipeline deliveries of kerosine totaled 47.7 million barrels in 1959 compared with 45 million in 1958. Waterborne shipments of kerosine from the Gulf Coast to the East Coast district increased 1.6 percent in 1959, but pipeline shipments were down 13.5 percent.

Tanker rates for kerosine from the gulf coast to U.S. destinations north of Hatteras averaged 34.4 cents per barrel in 1959, compared with 31.1 cents in 1958.

Digitized by Google

TABLE 58.—Salient statistics of kerosine in the United States, 1958–59,[1] by months and districts

(Thousand barrels)

Month and district	Production		Yield (percent)		Transfers from gasoline plants		Imports		Exports		Domestic demand		Stocks (end of period)	
	1958	1959 [2]	1958	1959 [2]	1958 [3]	1959 [2]	1958	1959 [2]	1958 [3]	1959 [2]	1958 [3]	1959 [2]	1958	1959 [2]
Month:														
January	11,204	12,978	4.7	5.0	176	134	-------	-------	74	74	17,433	17,997	23,073	21,090
February	10,651	11,686	5.0	5.0	106	90	-------	-------	89	28	16,539	13,113	17,202	19,725
March	10,436	9,484	4.6	3.7	128	100	17	113	62	41	11,015	10,693	16,706	18,688
April	8,102	8,269	3.8	3.6	61	59	-------	-------	53	33	6,087	5,980	18,729	21,003
May	7,036	7,574	3.1	3.1	105	57	-------	-------	59	24	4,374	4,013	21,437	24,597
June	6,978	7,314	3.1	3.0	95	75	-------	-------	67	70	4,276	4,552	24,167	27,364
July	6,984	6,967	2.9	2.8	83	101	-------	-------	45	41	5,534	6,063	25,655	28,328
August	8,202	7,264	3.3	2.9	120	76	-------	-------	48	77	5,267	4,370	28,662	31,221
September	8,544	8,305	3.6	3.5	123	61	17	1	60	155	6,027	7,871	31,259	31,562
October	9,778	8,886	4.0	3.7	80	54	-------	-------	235	47	9,005	8,059	31,877	32,396
November	10,500	9,992	4.4	4.1	132	87	-------	-------	280	51	10,109	11,723	32,120	30,701
December	11,593	11,943	4.5	4.7	85	107	-------	-------	145	389	17,613	15,545	[4] 26,049	26,817
Total	110,008	110,662	3.9	3.8	1,294	1,001	34	114	1,217	1,030	113,279	109,979	[4] 26,049	26,817
District:														
East Coast	10,722	11,765	2.5	2.6	-------	-------							10,921	11,520
Appalachian No. 1	1,385	1,367	4.0	3.9	-------	-------							494	702
Appalachian No. 2	2,015	2,083	5.5	5.5	-------	-------							421	385
Indiana, Illinois, Kentucky, etc.	24,008	25,342	4.8	4.7	-------	-------							5,622	5,716
Minnesota, Wisconsin, North Dakota, etc.	1,935	1,829	5.3	4.8	-------	-------							1,143	1,122
Oklahoma, Kansas, etc.	5,260	4,993	2.0	1.8	-------	-------	(5)	(5)	(5)	(5)	(5)	(5)	1,434	1,227
Texas Inland	3,072	2,965	3.1	2.8	512	466							411	481
Texas Gulf Coast	37,340	35,238	5.9	5.4	379	192							2,352	2,657
Louisiana Gulf Coast	19,370	20,602	7.9	7.9	181	124							1,715	1,763
Arkansas, Louisiana Inland, etc.	2,010	1,518	5.6	4.6	210	195							898	528
New Mexico	136	145	1.5	1.6	12	24							41	60
Rocky Mountain	1,013	1,196	1.0	1.1	-------	-------							222	264
West Coast	1,742	1,619	.4	.4	-------	-------							[4] 375	392
Total	110,008	110,662	3.9	3.8	1,294	1,001	34	114	1,217	1,030	113,279	109,979	[4] 26,049	26,817

[1] Data for 1959 includes Alaska: For details of Alaska see table 5.
[2] Preliminary figures.
[3] Revised.
[4] New basis for comparison with 1959: Old basis, stock 26,040,000 barrels; West Coast district, 366,000 barrels.
[5] Not available.

Digitized by Google

TABLE 59.—Sales of kerosine in the United States, 1958–59, by districts, States, and uses

(Thousand barrels)

District [1] and State	Sold as range oil		Tractor fuel		All other uses		Total	
	1958 [2]	1959	1958 [2]	1959	1958 [2]	1959	1958 [2]	1959
District 1:								
Connecticut	2,824	2,371	-------	21	111	545	2,935	2,937
Delaware	800	905	5	6	50	56	855	967
District of Columbia	189	123	4	1	12	15	205	139
Florida	4,196	3,798	53	26	864	714	5,113	4,538
Georgia	1,022	1,104	155	163	545	537	1,722	1,804
Maine	2,540	2,634	-------	16	19	296	2,559	2,946
Maryland	2,755	2,556	20	26	145	145	2,920	2,727
Massachusetts	6,332	5,486	-------	27	113	230	6,445	5,743
New Hampshire	1,265	939	-------	5	6	33	1,271	977
New Jersey	2,582	2,730	34	27	590	514	3,206	3,271
New York	6,166	5,555	15	60	729	692	6,910	6,307
North Carolina	10,338	10,888	46	13	1,414	1,816	11,798	12,717
Pennsylvania	3,094	3,250	56	202	563	730	3,713	4,182
Rhode Island	1,486	1,106	-------	27	8	40	1,494	1,173
South Carolina	3,480	3,815	17	11	885	972	4,382	4,798
Vermont	1,011	916	-------	-------	9	59	1,020	975
Virginia	4,544	5,196	34	31	351	282	4,929	5,509
West Virginia	157	197	6	3	165	146	328	346
Total	54,781	53,569	445	665	6,579	7,822	61,805	62,056
District 2:								
Illinois	6,480	3,234	11	70	1,431	2,242	7,922	5,546
Indiana	3,987	3,872	8	5	273	354	4,268	4,231
Iowa	2,406	2,552	32	10	173	187	2,611	2,749
Kansas	568	485	51	36	168	250	787	771
Kentucky	1,209	1,208	52	47	569	495	1,830	1,750
Michigan	5,456	6,596	-------	64	548	831	6,004	7,491
Minnesota	2,216	2,204	27	18	192	264	2,435	2,486
Missouri	1,622	2,261	44	41	269	435	1,935	2,737
Nebraska	641	563	25	20	160	150	826	733
North Dakota	845	921	5	5	42	43	892	969
Ohio	1,767	2,181	107	52	613	1,096	2,487	3,329
Oklahoma	229	150	81	51	166	251	476	452
South Dakota	861	939	-------	-------	38	60	899	999
Tennessee	1,338	1,307	33	33	595	1,168	1,966	2,508
Wisconsin	2,609	2,623	10	5	368	1,086	2,987	3,714
Total	32,234	31,096	486	457	5,605	8,912	38,325	40,465
District 3:								
Alabama	516	263	36	12	179	135	731	410
Arkansas	101	70	114	43	166	140	381	253
Louisiana	71	47	101	32	1,223	346	1,395	425
Mississippi	16	21	29	15	204	139	249	175
New Mexico	130	48	24	17	122	125	276	190
Texas	582	302	296	157	1,930	1,417	2,808	1,876
Total	1,416	751	600	276	3,824	2,302	5,840	3,329
District 4:								
Colorado	312	280	32	12	82	103	426	395
Idaho	32	97	-------	-------	17	12	49	109
Montana	278	505	-------	4	25	35	303	544
Utah	8	16	-------	-------	62	62	70	78
Wyoming	80	92	-------	8	167	76	247	176
Total	710	990	32	24	353	288	1,095	1,302
District 5:								
Alaska	(3)	3	(3)	-------	(3)	32	(3)	35
Arizona	1	-------	-------	-------	28	28	29	28
California	128	81	-------	-------	1,105	1,074	1,233	1,155
Nevada	-------	-------	-------	-------	2	4	2	4
Oregon	2	1	-------	-------	46	32	48	33
Washington	5	-------	-------	-------	76	87	81	87
Total	136	85	-------	-------	1,257	1,257	1,393	1,342
Total United States	89,277	86,491	1,563	1,422	17,618	20,581	108,458	108,494

[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[2] Revised.
[3] Not included in U.S. totals before 1959.

Digitized by Google

TABLE 60.—Monthly average prices of kerosine in the United States, 1958–59, in cents per gallon

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July
1958							
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.24	10.01	9.97	9.75	9.75	9.75	9.76
Kerosine (and/or No. 1 fuel oil) at New York Harbor	11.25	10.66	10.23	9.80	9.80	9.80	9.90
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	15.00	14.50	14.20	14.20	14.20	14.20	14.50
1959							
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.76	11.13	10.99	10.77	10.47	10.03	9.90
Kerosine (and/or No. 1 fuel oil) at New York Harbor	11.45	11.70	11.70	11.33	11.15	10.25	10.10
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	16.30	16.30	16.30	15.80	15.50	15.20	14.70

Year and grade	August	September	October	November	December	Average for year
1958						
42°–44° gravity, water-white kerosine at refineries, Oklahoma	10.00	10.25	10.25	10.25	10.34	10.03
Kerosine (and/or No. 1 fuel oil) at New York Harbor	10.28	10.40	10.40	10.55	11.04	10.34
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	14.80	14.80	14.80	15.30	15.80	14.70
1959						
42°–44° gravity, water-white kerosine at refineries, Oklahoma	9.69	9.63	9.63	9.96	10.59	10.29
Kerosine (and/or No. 1 fuel oil) at New York Harbor	9.88	9.80	9.80	9.80	10.40	10.61
Kerosine, tank-wagon at Chicago	17.10	17.10	17.10	17.10	17.10	17.10
Kerosine, tank-wagon at New York City [1]	14.40	14.40	14.40	14.40	15.40	15.30

[1] Manhattan and Queens.

Digitized by Google

DISTILLATE FUEL OIL

The total demand for distillate fuel oil increased less than 1 percent in 1959. Domestic demand increased 3.4 million barrels, but exports declined 3 million barrels. Warmer than normal weather in the last quarter of 1959 limited the demand to a small increase for the year.

Refinery output of 678.9 million barrels, output from natural-gas-liquids plants of 0.8 million barrels, direct transfers from crude oil of 1.0 million barrels, and imports of 17.5 million barrels resulted in a total new supply of distillate fuel oil of 698.2 million barrels in 1959. Supply exceeded demand by 25.5 million barrels, and stocks at year-end were the highest on record.

According to Platt's Oil Price Handbook, the average posted price for No. 2 fuel oil increased 0.23 cent at Oklahoma refineries and 0.31 cent at New York Harbor in 1959. Diesel oil for shore plants in the New York area averaged 0.25 cent higher for the year. Diesel oil for ships' bunkers in 1959 was 11 cents per barrel higher at New York Harbor and 10 cents per barrel higher at San Pedro, Calif., but declined 2 cents per barrel at New Orleans.

The tanker freight rate for No. 2 distillate fuel oil from the gulf coast to New York Harbor averaged 36.1 cents per barrel in 1959, compared with 32.8 cents in 1958.

Tidewater shipments of distillate fuel oil to east coast ports from gulf coast and west coast ports were about the same as in 1958. Deliveries of distillate fuel oil by pipeline were 10.2 percent higher in 1959.

Digitized by Google

TABLE 61.—Salient statistics of distillate fuel oil in the United States, 1958–59,[1] by months and districts

(Thousand barrels)

Month and district	Production		Yield (percent)		Transfers from gasoline plants		Transfers [2] east of California		Imports		Exports		Domestic demand		Stocks (end of period)	
	1958	1959 [3]	1958	1959 [3]	1958 [4]	1959 [3]	1958	1959 [3]	1958 [4]	1959 [3]	1958 [4]	1959 [3]	1958 [4]	1959 [3]	1958	1959 [3]
Month:																
January	57,120	66,124	23.7	25.3	73	67	93	89	941	1,556	1,555	1,261	83,746	95,234	122,375	96,849
February	48,179	60,458	22.5	25.6	61	54	86	83	1,009	1,585	1,835	856	81,969	74,102	87,906	84,071
March	51,149	61,610	22.6	24.1	68	70	85	89	566	3,467	1,889	1,427	62,570	67,218	75,315	80,662
April	47,032	52,181	21.8	22.5	71	53	84	82	1,217	1,877	1,165	951	46,315	47,682	76,239	86,222
May	50,723	54,295	22.1	22.4	81	50	74	81	984	811	1,557	1,122	37,384	37,474	89,160	102,863
June	48,342	53,745	21.2	22.0	58	54	72	79	1,172	1,841	1,309	1,182	32,184	36,438	105,311	120,962
July	51,145	53,279	21.0	21.8	60	64	72	75	1,849	1,055	2,078	886	36,922	34,161	119,437	140,388
August	52,878	55,921	21.4	22.1	50	63	72	74	1,304	818	1,906	1,673	31,973	31,457	139,862	164,134
September	53,506	52,355	22.4	22.0	54	79	76	72	1,663	1,181	1,563	979	38,186	42,694	155,412	174,148
October	56,372	53,816	23.2	22.6	71	82	76	77	1,272	675	1,073	883	47,444	46,075	164,686	181,840
November	54,364	55,044	22.9	22.9	62	73	78	79	1,144	822	2,027	849	57,115	65,895	161,192	171,114
December	60,595	60,110	23.6	23.4	64	98	82	90	1,771	1,789	985	1,195	97,618	80,976	[5] 125,508	151,030
Total	631,405	678,938	22.4	23.1	773	807	950	970	14,892	17,477	18,942	13,264	653,426	659,406	[5] 125,508	151,030
District:																
East Coast	113,982	125,597	26.5	28.0											46,040	57,981
Appalachian No. 1	7,730	7,848	22.3	22.2											3,024	4,182
Appalachian No. 2	6,918	6,893	19.0	18.3											1,158	1,584
Indiana, Illinois, Kentucky, etc.	108,092	115,715	21.4	21.6			250	277							21,599	24,532
Minnesota, Wisconsin, etc.	9,639	9,373	26.5	24.6				27							6,478	6,852
Oklahoma, Kansas, etc.	63,186	67,287	24.3	25.5			151	163							9,835	11,300
Texas Inland	17,417	17,761	17.3	16.8	350	392	198	161	(6)	(6)	(6)	(6)	(6)	(6)	2,252	1,805
Texas Gulf Coast	161,938	169,187	25.5	26.1	134	109	101	95							11,321	17,836
Louisiana Gulf Coast	53,619	61,528	21.8	23.6	18	20	38	51							5,593	6,088
Arkansas, Louisiana Inland, etc.	8,010	7,194	22.4	21.9	271	286	32	31							2,123	2,673
New Mexico	1,655	1,669	18.6	19.0			97	85							141	183
Rocky Mountain	21,693	22,700	22.2	21.5			83	80							2,828	2,492
West Coast	57,526	66,186	14.5	15.7											[5] 13,116	13,522
Total	631,405	678,938	22.4	23.1	773	807	950	970	14,892	17,477	18,942	13,264	653,426	659,406	[5] 125,508	151,030

[1] Data for 1959 includes Alaska: For details of Alaska see table 5.
[2] Figures represent crude oil used as fuel on pipelines, which is considered part of the demand for distillate.
[3] Preliminary figures.
[4] Revised.
[5] New basis for comparison with 1959: Old basis, stock 125,101,000 barrels; West Coast district, 12,709,000 barrels.
[6] Not available.

Digitized by Google

TABLE 62.—Sales of distillate fuel oil[1] in the United States, 1955–59 by uses

(Thousand barrels)

Uses	1955	1956	1957	1958	1959[2]	Change, percent
Heating oils	339,215	359,827	360,212	[3] 399,153	402,610	0.9
Range oil (No. 1 fuel oil)	17,374	17,435	16,832	[3] 13,517	14,153	4.7
Industrial (excluding oil-company use)	43,606	44,949	43,532	[3] 37,553	33,007	−12.1
Oil-company use (excluding heating oil)	8,597	10,131	10,419	7,815	8,642	10.6
Gas and electric public-utility power-plants	5,884	5,403	5,296	5,382	5,005	−7.0
Railroads	84,668	89,439	88,315	83,719	87,802	4.9
Bunkering of vessels (including company tankers but excluding military)	16,675	18,487	20,420	18,768	19,250	2.6
Military use (U.S. Army, Navy, Air Force, and Marine Corps)	10,945	11,326	12,737	13,412	11,394	−15.1
Miscellaneous uses	54,163	58,778	59,512	74,240	77,129	3.9
Total United States	581,127	615,775	617,275	653,559	658,992	.8

[1] Includes diesel fuel.
[2] Includes Alaska.
[3] Revised.

Digitized by Google

TABLE 63.—Sales of distillate fuel oil [1] in the United States, 1955–59, by districts and States

(Thousand barrels)

District [2] and State	1955	1956	1957	1958	1959
District 1:					
Connecticut	16,071	18,490	18,574	23,885	23,253
Delaware	2,677	3,235	3,245	2,413	2,608
District of Columbia	3,907	4,139	4,124	3,402	2,899
Florida	9,613	10,169	10,188	8,150	9,134
Georgia	4,560	4,914	4,877	4,887	4,961
Maine	5,703	6,425	6,426	6,434	7,453
Maryland	16,009	17,916	18,091	16,086	13,102
Massachusetts	34,036	35,859	35,981	47,452	44,479
New Hampshire	4,498	5,123	5,089	3,951	4,246
New Jersey	38,971	41,335	41,370	42,923	47,851
New York	70,276	72,606	72,755	85,779	82,741
North Carolina	8,982	9,279	9,312	10,406	12,105
Pennsylvania	44,286	45,734	45,698	45,322	46,168
Rhode Island	4,762	5,513	5,530	7,250	7,516
South Carolina	3,259	3,445	3,588	4,266	4,670
Vermont	1,726	1,937	1,883	2,796	2,515
Virginia	13,242	14,293	14,782	13,300	13,615
West Virginia	1,500	2,095	2,039	1,913	2,284
Total	284,078	302,507	303,552	330,615	331,600
District 2:					
Illinois	33,371	35,290	35,350	42,869	40,939
Indiana	18,962	20,441	20,482	24,099	23,329
Iowa	11,417	12,543	12,548	9,883	10,816
Kansas	6,493	6,388	6,361	4,477	4,818
Kentucky	4,126	4,476	4,548	4,978	5,535
Michigan	27,402	29,071	28,995	29,385	27,030
Minnesota	17,409	18,765	18,726	16,468	14,358
Missouri	12,137	12,306	12,418	14,274	12,093
Nebraska	5,229	5,561	5,549	3,527	3,741
North Dakota	3,151	3,740	3,726	2,976	3,458
Ohio	20,184	21,937	22,045	24,221	23,662
Oklahoma	2,493	2,454	2,470	1,754	2,479
South Dakota	3,298	3,556	3,508	2,800	2,744
Tennessee	3,845	3,767	3,652	3,226	4,796
Wisconsin	16,089	17,099	17,149	20,136	19,345
Total	185,606	197,394	197,527	205,073	199,143
District 3:					
Alabama	3,914	4,277	4,326	4,346	4,891
Arkansas	2,357	2,558	2,575	2,433	2,175
Louisiana	7,385	7,653	7,877	10,756	11,249
Mississippi	1,808	1,840	1,856	1,744	2,318
New Mexico	1,991	2,167	2,205	2,492	2,302
Texas	20,728	22,258	22,812	24,077	26,541
Total	38,183	40,753	41,651	45,848	49,476
District 4:					
Colorado	3,371	3,532	3,585	3,238	3,099
Idaho	3,706	3,837	3,834	3,938	3,734
Montana	3,980	4,219	4,209	3,642	4,474
Utah	3,994	4,235	4,256	4,655	3,478
Wyoming	2,829	3,092	2,977	3,697	3,539
Total	17,880	18,915	18,861	19,170	18,324
District 5:					
Alaska	[3]	[3]	[3]	[3]	2,618
Arizona	1,073	1,716	1,742	2,018	2,100
California	23,873	24,643	24,613	24,884	26,357
Nevada	1,686	1,748	1,679	1,656	2,051
Oregon	10,981	10,862	10,132	9,380	10,456
Washington	17,767	17,237	17,518	14,915	16,867
Total	55,380	56,206	55,684	52,853	60,449
Total United States	581,127	615,775	617,275	653,559	658,992

[1] Includes diesel fuel oil.
[2] States are grouped according to petroleum-marketing districts rather than conventional regions.
[3] Not included in U.S. totals before 1959.

Digitized by Google

TABLE 64.—Monthly average prices of distillate fuel oil and diesel fuel in the United States, 1958–59

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1958													
No. 2 fuel oil at refineries, Oklahoma cents per gallon	9.18	8.95	8.82	8.68	8.56	8.56	8.60	8.77	9.00	9.04	9.25	9.29	8.89
No. 2 fuel oil at New York Harbor cents per gallon	10.75	10.16	9.73	9.30	9.30	9.30	9.40	9.78	9.90	9.90	10.05	10.54	9.84
Diesel oil, shore plants, New York cents per gallon	11.15	10.56	10.13	9.70	9.70	9.70	9.80	10.18	10.30	10.30	10.46	10.94	10.24
Diesel oil for ships:													
New York dollars per barrel	4.54	4.29	4.11	3.93	3.93	3.93	4.06	4.13	4.18	4.18	4.24	4.45	4.16
New Orelans do	4.20	4.08	3.96	3.90	3.90	3.90	3.94	4.10	4.15	4.15	4.18	4.34	4.07
San Pedro do	5.11	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.96	4.97
1959													
No. 2 fuel oil at refineries, Oklahoma cents per gallon	9.66	10.00	9.83	9.59	9.24	8.93	8.72	8.54	8.25	8.34	8.82	9.48	9.12
No. 2 fuel oil at New York Harbor cents per gallon	11.45	11.20	11.20	10.83	10.65	9.75	9.60	9.38	9.30	9.30	9.30	9.79	10.15
Diesel oil, shore plants, New York cents per gallon	11.38	11.60	11.60	11.23	11.05	10.15	10.00	9.75	9.65	9.65	9.65	10.13	10.49
Diesel oil for ships:													
New York dollars per barrel	4.64	4.73	4.73	4.57	4.52	4.13	4.06	3.96	3.93	3.93	3.93	4.14	4.27
New Orleans do	4.43	4.44	4.44	4.28	4.13	3.94	3.88	3.86	3.77	3.77	3.77	3.90	4.05
San Pedro do	4.96	4.96	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.09	5.07

Digitized by Google

RESIDUAL FUEL OIL

The total demand for residual fuel oil in 1959 was 5 percent higher than in 1958. Domestic demand increased from 531.1 million barrels in 1958 to 558.3 million in 1959, a gain of 5.1 percent. Exports rose 3.5 percent above 1958.

The 1959 refinery output of residual fuel oil was 347.9 million barrels, representing a yield from crude runs to stills of 11.8 percent compared with a yield of 12.9 percent in 1958. Crude used directly as fuel oil totaled 7.4 million barrels—32.6 percent less than in 1958. Imports, which make up the balance of new supply, were 223.3 million barrels in 1959, compared with 182 million in 1958. The total new supply of residual fuel oil in 1959 was 578.6 million barrels, and 6.4 million barrels was withdrawn from stocks to meet the total demand.

Residual fuel oil stocks in the United States were reduced at the rate of 17,000 barrels daily in 1959. Stocks in the West Coast district declined at the rate of 28,000 barrels daily, whereas stocks in States east of the Rocky Mountains increased 11,000 barrels daily during the year.

Imports of residual fuel oil into the United States were placed under manatory oil import regulations in April 1959 by Presidential Proclamation No. 3279. Quotas, based on the level of imports in 1957, were assigned to all importers of record who had imported residual fuel oil during 1957. Excluded from the controls were imports of residual fuel oil for bunkering vessels engaged in foreign trade, imports by the military for offshore use, and imports for manufacturing and reexport.

Shipments to the East Coast district from the Gulf Coast district were 4.1 million barrels less than in 1958, but shipments from the West Coast district increased 2 million barrels.

The tanker freight rate for Bunker "C" fuel oil from the U.S. gulf coast to destinations north of Hatteras increased from an average of 34.2 cents a barrel in 1958 to 44.8 cents in 1959.

The average price of No. 6 fuel oil at Oklahoma refineries in 1959 was $1.97 cents per barrel, an increase of 24 cents per barrel for the year. The price of No. 5 fuel oil at New York Harbor declined 11 cents a barrel to $2.92 in 1959. Prices on Bunker "C" fuel oil declined 33 cents per barrel at San Pedro, Calif., 22 cents at New York Harbor, and 21 cents at New Orleans.

Total sales of residual fuel oil were 4.3 percent higher in 1959, and sales in District 1 increased 7.1 percent. Industrial use of residual fuel oil was 167.7 million barrels in 1959 compared with 143.1 million in 1958.

Digitized by Google

TABLE 65.—Salient statistics of residual fuel oil in the United States, 1958–59,[1] by months and districts

(Thousand barrels)

Month and district	Production		Yield (percent)		Transfers [2]				Imports		Exports		Domestic demand		Stocks (end of period)	
					East of California		California									
	1958	1959 [3]	1958	1959 [3]	1958	1959 [3]	1958	1959 [3]	1958 [4]	1959 [3]	1958 [4]	1959 [3]	1958 [4]	1959 [3]	1958	1959 [3]
Month:																
January	33,803	34,622	14.0	13.3	1,241	995	145	58	20,555	26,153	1,695	3,234	56,446	62,940	57,562	55,214
February	31,054	31,493	14.5	13.3	876	845	107	53	17,516	26,354	1,573	2,345	50,447	57,436	55,095	54,178
March	31,468	32,569	13.9	12.7	1,212	942	252	96	15,097	31,409	1,989	2,703	46,206	59,281	54,929	57,210
April	28,412	28,104	13.2	12.1	948	629	106	102	16,693	14,984	1,564	2,572	41,549	45,130	57,975	53,327
May	28,537	27,874	12.4	11.5	757	427	128	58	12,619	13,861	2,557	1,950	35,870	37,776	61,589	55,821
June	27,346	27,448	12.0	11.3	665	396	36	84	10,581	14,671	2,356	2,499	33,997	40,442	63,864	55,479
July	30,407	25,514	12.5	10.4	359	419	212	38	12,367	11,272	2,657	2,145	38,095	36,068	66,457	54,509
August	29,789	27,393	12.0	10.8	844	416	406	32	11,119	11,764	2,271	1,554	39,114	34,705	67,230	57,855
September	29,197	25,581	12.2	10.7	699	372	257	70	9,900	15,312	2,782	1,887	36,831	37,874	67,670	59,429
October	29,738	26,949	12.2	11.3	359	348	251	66	16,530	13,487	2,488	2,403	45,015	38,370	67,045	59,506
November	29,361	29,147	12.4	12.1	386	354	125	24	15,894	21,050	1,997	1,339	44,591	50,155	66,223	58,587
December	34,246	31,206	13.3	12.2	437	527	157	35	23,165	22,938	1,814	1,409	62,906	58,623	[5] 59,560	53,261
Total	363,358	347,900	12.9	11.8	[6] 8,783	6,670	2,182	716	182,036	223,255	25,743	26,040	531,067	558,800	[5] 59,560	53,261
District:																
East Coast	66,813	61,657	15.5	13.8	[6] 4,239	1,940	--------	--------							10,245	13,092
Appalachian No. 1	3,001	3,440	8.7	9.7	--------	--------	--------	--------							329	386
Appalachian No. 2	3,835	4,589	10.5	12.2	--------	--------	--------	--------							195	440
Indiana, Illinois, Kentucky, etc.	57,383	62,311	11.4	11.6	1,560	1,902	--------	--------							4,241	5,634
Minnesota, Wisconsin, etc.	3,999	4,831	11.0	12.7	36	65	--------	--------							517	751
Oklahoma, Kansas, etc.	10,224	9,200	3.9	3.5	360	360	--------	--------							1,071	1,067
Texas Inland	7,440	7,714	7.4	7.3	604	489	--------	--------	(7)	(7)	(7)	(7)	(7)	(7)	2,182	2,392
Texas Gulf Coast	69,805	57,891	11.0	8.9	651	615	--------	--------							6,099	5,193
Louisiana Gulf Coast	16,174	18,018	6.6	6.9	770	751	--------	--------							1,618	925
Arkansas, Louisiana Inland, etc.	2,560	2,211	7.2	6.7	224	216	--------	--------							116	239
New Mexico	953	892	10.7	10.1	87	80	--------	--------							20	31
Rocky Mountain	11,497	12,512	11.8	11.8	252	252	--------	--------							783	1,083
West Coast	109,674	102,634	27.7	24.4	--------	--------	2,182	716							[5] 32,144	22,028
Total	363,358	347,900	12.9	11.8	[6] 8,783	6,670	2,182	716	182,036	223,255	25,743	26,040	531,067	558,800	[5] 59,560	53,261

[1] Data for 1959 includes Alaska; for details of Alaska see table 5.
[2] Represents crude oil used as fuel on leases and for general industrial purposes.
[3] Preliminary figures.
[4] Revised.
[5] New basis for comparison with 1959: Old basis, stock 59,508,000 barrels; West Coast district 32,092,000 barrels.
[6] Includes heavy crude oil imported and used directly as fuel oil.
[7] Not available.

Digitized by Google

TABLE 66.—Sales of residual fuel oil [1] in the United States, 1955–59, by uses

(Thousand barrels)

Uses	1955	1956	1957	1958	1959 [2]	Change, percent
Heating oils	86,282	87,601	81,412	[3] 105,639	111,850	5.9
Industrial (excluding oil-company fuel)	173,030	177,807	166,885	[3] 143,142	167,701	17.2
Oil-company use	53,387	53,271	50,153	46,463	46,177	−0.6
Gas and electric public-utility power-plants	75,966	73,987	76,577	[3] 76,995	82,208	6.8
Railroads	15,018	10,575	6,953	5,772	5,613	−2.8
Bunkering of vessels (including company tankers but excluding military)	115,128	117,445	123,651	106,269	102,049	−4.0
Military use (U.S. Army, Navy, Air Force, and Marine Corps)	28,368	30,546	28,962	37,428	31,415	−16.1
Miscellaneous uses	9,804	10,331	9,984	9,659	7,339	−24.0
Total United States	556,983	561,563	544,577	531,367	554,352	4.3

[1] Includes Navy Grade and crude oil burned as fuel.
[2] Includes Alaska.
[3] Revised.

Digitized by Google

TABLE 67.—Sales of residual fuel oil [1] in the United States, 1955–59, by districts and States

(Thousand barrels)

District [2] and State	1955	1956	1957	1958	1959
District 1:					
Connecticut	13,108	13,219	12,712	17,041	15,814
Delaware	2,907	2,956	2,973	5,992	7,063
District of Columbia	2,152	2,106	2,501	2,243	2,450
Florida	32,236	34,910	36,228	37,470	33,310
Georgia	6,118	5,955	6,128	7,145	6,824
Maine	4,443	4,872	5,063	5,290	6,433
Maryland	15,466	15,770	15,364	14,971	17,385
Massachusetts	30,496	29,574	28,744	29,308	35,532
New Hampshire	2,377	2,107	2,096	2,022	2,984
New Jersey	46,154	44,587	45,136	36,841	41,422
New York	51,912	51,737	51,168	71,533	79,784
North Carolina	2,377	2,558	2,467	3,034	3,908
Pennsylvania	45,176	45,325	44,482	39,873	45,660
Rhode Island	11,215	11,303	11,114	11,127	10,350
South Carolina	4,291	4,389	4,383	4,660	4,886
Vermont	424	402	380	455	275
Virginia	16,556	17,452	17,739	21,411	17,703
West Virginia	1,355	1,317	1,321	894	1,620
Total	288,763	290,539	289,999	311,313	333,403
District 2:					
Illinois	22,227	22,571	21,375	26,926	23,689
Indiana	14,588	15,206	14,753	11,955	13,035
Iowa	994	1,165	1,125	869	1,067
Kansas	4,179	3,827	3,586	1,420	1,826
Kentucky	1,013	1,062	1,051	503	570
Michigan	15,387	16,008	15,330	9,340	13,498
Minnesota	2,700	2,987	2,955	4,963	6,399
Missouri	5,863	6,126	5,758	3,774	3,394
Nebraska	363	377	375	151	144
North Dakota	515	870	783	625	584
Ohio	18,915	19,269	18,530	9,721	11,028
Oklahoma	1,783	1,857	1,740	1,001	1,319
South Dakota	176	211	217	100	48
Tennessee	930	879	865	384	244
Wisconsin	2,168	2,290	2,201	3,458	4,167
Total	91,801	94,696	90,644	75,190	81,012
District 3:					
Alabama	3,907	4,162	4,203	4,240	4,169
Arkansas	419	545	549	455	322
Louisiana	10,601	10,804	11,359	13,411	10,603
Mississippi	179	219	232	268	362
New Mexico	283	505	438	359	107
Texas	38,108	37,883	37,859	29,082	25,452
Total	53,497	54,118	54,640	47,815	41,105
District 4:					
Colorado	1,363	1,434	1,369	1,330	1,603
Idaho	1,421	1,256	1,185	210	185
Montana	1,692	1,646	1,554	1,643	2,006
Utah	4,392	4,478	4,828	5,077	5,872
Wyoming	2,118	2,156	1,847	2,325	1,842
Total	10,986	10,970	10,783	10,585	11,508
District 5:					
Alaska	[3]	[3]	[3]	[3]	574
Arizona	61	35	21	37	34
California	83,959	84,421	79,245	72,232	72,287
Nevada	1,359	383	269	195	146
Oregon	10,152	9,401	7,181	5,253	5,121
Washington	16,405	16,975	11,795	8,747	9,162
Total	111,936	111,215	98,511	86,464	87,324
Total United States	556,983	561,538	544,577	531,367	554,352

[1] Includes some crude oil burned as fuel.
[2] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[3] Not included in United States totals before 1959.

Digitized by Google

TABLE 68.—Monthly average prices of residual fuel oil in the United States, 1958–59, in dollars per barrel

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July
1958							
No. 6 fuel oil at refineries, Oklahoma	2.03	1.88	1.68	1.71	1.73	1.73	1.64
No. 5 fuel oil at New York Harbor	3.37	3.19	3.10	3.10	3.10	3.07	2.95
Bunker "C" for ships:							
New York	2.92	2.74	2.65	2.65	2.62	2.61	2.61
New Orleans	2.62	2.44	2.35	2.35	2.35	2.35	2.35
San Pedro	2.72	2.65	2.65	2.54	2.45	2.45	2.45
1959							
No. 6 fuel oil at refineries, Oklahoma	2.02	2.18	2.18	2.15	1.94	1.88	1.88
No. 5 fuel oil at New York Harbor	2.88	2.97	2.97	2.97	2.97	2.91	2.89
Bunker "C" for ships:							
New York	2.41	2.41	2.41	2.41	2.41	2.37	2.32
New Orleans	2.10	2.10	2.10	2.10	2.10	2.10	2.10
San Pedro	2.10	2.10	2.10	2.10	2.10	2.10	2.10

Year and grade	August	September	October	November	December	Average for year
1958						
No. 6 fuel oil at refineries, Oklahoma	1.59	1.60	1.63	1.73	1.83	1.73
No. 5 fuel oil at New York Harbor	2.95	2.93	2.87	2.87	2.87	3.03
Bunker "C" for ships:						
New York	2.61	2.52	2.40	2.41	2.41	2.60
New Orleans	2.35	2.31	2.10	2.10	2.10	2.31
San Pedro	2.45	2.44	2.11	2.10	2.10	2.43
1959						
No. 6 fuel oil at refineries, Oklahoma	1.88	1.88	1.88	1.88	1.93	1.97
No. 5 fuel oil at New York Harbor	2.89	2.89	2.89	2.89	2.96	2.92
Bunker "C" for ships:						
New York	2.34	2.37	2.37	2.37	2.37	2.38
New Orleans	2.10	2.10	2.10	2.10	2.10	2.10
San Pedro	2.10	2.10	2.10	2.10	2.10	2.10

LUBRICANTS

Total demand for lubricants (56,850,000 barrels) increased 8.3 percent in 1959, exports 9.0 percent, and domestic demand 8.1 percent.

All refining districts except the Appalachian No. 1 and the Rocky Mountain district produced more lubricants in 1959. Production for the year totaled 56.1 million barrels, compared with 51.3 million in 1958.

Digitized by Google

TABLE 69.—Salient statistics of lubricants in the United States, 1958–59, by months and districts

(Thousand barrels unless otherwise stated)

Month and district	1958					1959 [1]				
	Production	Yield (percent)	Exports	Stocks, end of period	Domestic demand	Production	Yield (percent)	Exports	Stocks, end of period	Domestic demand
By months:										
January	4,221	1.8	850	11,284	2,951	4,360	1.7	1,051	9,494	3,504
February	3,843	1.8	1,013	11,360	2,754	3,941	1.7	961	9,728	2,746
March	3,973	1.7	936	11,218	3,179	4,652	1.8	1,174	9,407	3,799
April	4,065	1.9	1,186	11,090	3,007	4,751	2.0	1,411	9,170	3,577
May	4,325	1.9	1,174	11,011	3,230	4,754	2.0	1,181	8,912	3,831
June	4,224	1.8	870	10,659	3,706	4,615	1.9	1,231	8,396	3,900
July	4,397	1.8	1,184	10,574	3,298	4,958	2.0	1,281	8,402	3,671
August	4,564	1.8	1,398	10,215	3,525	4,593	1.8	1,154	8,274	3,567
September	4,162	1.7	978	10,037	3,362	4,867	2.0	1,026	8,378	3,737
October	4,519	1.9	1,267	9,765	3,524	4,934	2.1	1,278	8,237	3,797
November	4,313	1.8	1,169	9,412	3,497	4,718	2.0	908	8,792	3,255
December	4,692	1.8	978	[2] 9,689	3,439	4,968	1.9	1,477	8,950	3,333
Total	51,298	1.8	13,003	[2] 9,689	39,472	56,111	1.9	14,133	8,950	42,717
By districts:										
East Coast	6,734	1.6		2,193		7,754	1.7		1,965	
Appalachian No. 1	3,525	10.2		808		3,301	9.3		502	
Appalachian No. 2	359	1.0		35		506	1.3		34	
Indiana, Illinois, Kentucky, etc	4,266	.8		1,341		4,502	.8		1,392	
Oklahoma, Kansas, etc	4,280	1.6	[3]	592	[3]	4,589	1.7	[3]	410	[3]
Texas Inland	3	----------		1		135	.1		20	
Texas Gulf Coast	19,673	3.1		2,990		21,098	3.3		3,070	
Louisiana Gulf Coast	5,547	2.3		814		6,695	2.6		642	
Arkansas, Louisiana Inland, etc	1,560	4.4		122		1,953	5.9		177	
Rocky Mountain	260	.3		162		209	.2		87	
West Coast	5,091	1.3		629		5,369	1.3		651	
Total	51,298	1.8		[2] 9,689		56,111	1.9		8,950	

[1] Preliminary figures.
[2] New basis; includes bulk terminal stocks in Alaska of 2,000 barrels.
[3] Figures not available.

Digitized by Google

TABLE 70.—Average monthly refinery prices of five selected grades of lubricating oil in the United States, 1958–59, in cents per gallon

[Platt's Oil Price Handbook]

Year and grade	January	February	March	April	May	June	July	August	September	October	November	December	Average for year
1958													
Oklahoma:													
200 viscosity, No. 3 color, neutral	18.75	18.75	18.41	17.03	17.00	17.00	17.00	17.00	17.00	17.00	17.00	17.00	17.41
150–160 viscosity at 210° bright stock, 10–25 pour test	23.00	23.00	22.61	20.55	20.50	20.50	20.50	20.50	20.50	20.50	20.50	20.50	21.10
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	25.00	24.68	24.50	24.32	22.00	21.57	21.00	21.00	21.00	21.00	21.00	21.00	22.34
600 steam-refined, cylinder stock, filterable	19.59	18.74	18.50	18.22	15.19	15.00	15.00	15.00	15.00	15.00	15.00	15.00	16.27
South Texas: 500 viscosity, No. 2½–3½ color, neutral	18.00	17.89	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	17.99
1959													
Oklahoma:													
200 viscosity, No. 3 color, neutral	17.00	17.00	17.00	17.00	17.00	17.00	17.03	17.97	18.00	18.00	18.45	19.00	17.54
150–160 viscosity at 210° bright stock, 10–25 pour test	20.50	20.50	20.50	20.50	20.50	20.50	20.56	21.50	21.50	21.50	21.93	22.50	21.04
Pennsylvania:													
200 viscosity, No. 3 color, neutral 420–425 flash, 25 pour test	21.00	21.00	21.00	21.00	21.00	21.00	22.77	23.00	24.73	25.00	25.00	25.48	22.67
600 steam-refined, cylinder stock, filterable	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.87	16.00	16.00	16.71	15.38
South Texas: 500 viscosity, No. 2½–3½ color, neutral	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.33	19.00	18.11

Digitized by Google

JET FUEL

Jet fuel is blended to specifications from gasoline, kerosine, and distillate fuel oil. It is used principally by the military for aircraft engines or by aircraft manufacturers for testing these engines. The turboprop and jet-engined aircraft in commercial service use straight kerosine for fuel.

Demand for jet fuel in 1959 totaled 104.2 million barrels, an increase of 10.1 million barrels over 1958.

Digitized by Google

TABLE 71.—Salient statistics of jet fuel in the United States, 1958–59, by months and districts

(Thousand barrels)

	Production, blended from—				Transfers from gasoline plants	Imports	Exports	Stocks, end of period	Domestic demand	Production, blended from—				Transfers from gasoline plants	Imports	Exports	Stocks, end of period	Domestic demand
	Gasoline	Kerosine	Distillate	Total						Gasoline	Kerosine	Distillate	Total					
	1958									1959 [1]								
By months:																		
January	3,258	707	577	4,542	------	2,011	17	4,801	6,484	4,499	943	670	6,112	46	2,298	------	5,012	8,086
February	3,419	843	363	4,625	165	1,712	------	4,451	6,852	4,717	877	624	6,218	47	1,215	35	4,984	7,203
March	4,353	895	449	5,697	130	1,808	------	4,488	7,598	5,951	1,022	985	7,958	153	851	14	6,058	7,568
April	4,837	1,087	632	6,556	95	2,678	1	4,981	8,835	5,372	1,145	637	7,154	92	1,307	1	6,027	8,589
May	4,847	1,233	426	6,506	62	728	5	5,494	6,778	4,805	1,481	774	7,060	81	480	27	6,048	7,476
June	4,464	1,546	470	6,480	85	1,760	5	5,752	8,062	5,254	1,358	719	7,331	108	515	5	6,007	7,914
July	4,317	1,639	358	6,314	78	2,135	------	6,004	8,275	5,610	1,521	843	7,974	59	952	2	5,982	8,983
August	4,558	1,611	382	6,551	76	774	25	6,253	7,127	6,125	2,137	782	9,044	2	697	72	6,364	9,233
September	4,733	1,771	557	7,061	112	2,051	56	6,145	9,276	5,249	2,129	821	8,199	28	2,285	14	5,846	10,994
October	4,891	1,093	574	6,558	68	2,350	73	5,373	9,675	5,728	2,205	855	8,788	105	656	78	5,956	9,364
November	4,283	979	542	5,804	40	1,090	24	5,184	7,099	5,493	1,913	780	8,186	40	994	62	6,424	8,767
December	5,235	1,112	635	6,982	113	1,713	5	[2] 5,887	8,116	5,422	2,824	663	8,909	109	1,432	80	6,612	10,064
Total	53,195	14,516	5,965	73,676	1,024	20,810	211	[2] 5,887	94,177	64,225	19,555	9,153	92,933	870	13,682	390	6,612	104,241
By districts:																		
East Coast	932	148	71	1,151	------	[3]	[3]	512	[3]	2,487	375	242	3,104	------	[3]	[3]	574	[3]
Appalachian No. 1	355	------	------	355	------			38		205	------	------	205	------			9	
Appalachian No. 2	17	------	------	17	------			18		37	87	------	124	------			18	
Indiana, Illinois, Kentucky, etc.	4,874	369	670	5,913	------			570		4,453	1,391	1,254	7,098	------			588	
Minnesota, Wisconsin, North and South Dakota	417	------	------	417	------			47		419	16	------	435	------			77	
Oklahoma, Kansas, Missouri, etc.	8,535	2,500	1,272	12,307	------			748		10,990	2,754	1,710	15,454	------			868	
Texas Inland	8,877	278	823	9,978	------			667		10,297	609	1,306	12,212	129			527	
Texas Gulf Coast	8,570	4,251	789	13,610	------			886		8,388	8,318	387	17,093	------			1,113	
Louisiana Gulf Coast	4,582	1,251	------	5,833	------			432		8,103	175	338	8,616	------			719	
Arkansas, Louisiana Inland, etc.	421	------	------	421	1,024			68		716	------	------	716	741			33	
New Mexico	1,052	------	------	1,052	------			126		545	17	648	1,210	------			61	
Rocky Mountain	3,330	936	593	4,859	------			458		4,877	1,315	566	6,758	------			418	
West Coast	11,233	4,783	1,747	17,763	------			1,301		12,708	4,498	2,702	19,908	------			1,607	
Total	53,195	14,516	5,965	73,676	1,024	------	------	[2] 5,887	------	64,225	19,555	9,153	92,933	870	------	------	6,612	------

[1] Preliminary figures.
[2] New basis; includes bulk terminal stocks in Alaska of 16,000 barrels.
[3] Figures not available.

Digitized by Google

LIQUEFIED GASES

Liquefied gases are derived from two sources. Those produced at refineries are called liquefied refinery gases to distinguish them from those extracted from natural gas, which are called liquefied petroleum gases. All liquefied petroleum gases are saturated (that is, propane, butane, etc.). The liquefied refinery gases may contain unsaturated compounds or olefins (that is, propylene, butylene, etc.). The olefins are used as feed stock for chemical plants. The saturated gases may be used as chemical raw material or as fuel. Liquefied gases are also used in producing gasoline and are reported in this chapter as natural-gas liquids used at refineries or as gasoline.

The production of liquefied gases increased 10.2 percent in 1959 to 388.2 million barrels. Natural-gasoline plants produced 320.5 million barrels and refineries 67.7 million barrels. The total demand for liquefied gases was 386.1 million barrels in 1959.

More detailed information on liquefied gases may be found in the Natural-Gas Liquids chapter.

ASPHALT AND ROAD OIL

Production of petroleum asphalt was 17,753 short tons in 1959, an increase of 9 percent over 1958. Imports and exports decreased 8 and 24 percent, respectively, in 1959. Stocks were 12 percent higher at yearend 1959 than at yearend 1958. Apparent domestic consumption (production, plus imports, less exports, and plus or minus the change in stocks) increased 6 percent over 1958.

Road-oil production in 1959 increased 10 percent, apparent consumption 3 percent, and yearend stocks 57 percent.

Sales of asphalt and asphaltic products in 1959 totaled 19.8 million short tons, an increase of 9 percent over 1958. Asphalt sales for paving (14.6 million short tons in 1959) continued their upward trend, increasing 9 percent over 1958. The proportion of asphalt sales for

TABLE 72.—Statistical summary of petroleum asphalt and road oil, 1955–59

(Thousand short tons) [1]

	1955	1956	1957	1958	1959
Petroleum asphalt:					
Production	15,113	16,479	15,579	16,251	17,753
Imports [2] (including natural)	605	656	1,162	[3] 1,360	1,249
Exports [4]	285	275	325	[3] 248	188
Stocks (end of period)	1,413	1,664	1,902	1,774	1,990
Apparent domestic consumption [5]	15,325	16,609	[3] 16,178	[3] 17,491	18,598
Petroleum asphalt sales:					
Paving	10,766	12,208	11,934	13,384	14,581
Roofing	3,502	3,411	2,819	3,101	3,299
All other	1,412	1,638	1,620	1,694	1,895
Total	15,680	17,257	16,373	18,179	19,775
Road oil:					
Production	1,542	1,459	1,311	1,077	1,181
Stocks (end of period)	102	91	107	[3] 76	119
Apparent domestic consumption [6]	1,519	1,470	1,295	[3] 1,108	1,138
Sales	1,460	1,493	1,306	1,165	1,143

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Imports into continental United States only.
[3] Revised.
[4] Includes shipments to noncontiguous Territories.
[5] Production, plus imports, less exports, plus or minus change in stocks.
[6] Production, plus or minus change in stocks.

Digitized by Google

paving to total domestic sales remained the same as in 1958 (74 percent).

Road-oil sales in 1959 continued the downward trend of the preceding 3 years and declined 2 percent compared with 1958.

Total imports of asphalts (solid and liquid petroleum asphalts and natural asphalts), including imports to Territories and possessions, decreased 7 percent from 1.4 million short tons in 1958 to 1.3 million short tons in 1959. Import values of $18.9 million in 1958 declined to $17 million in 1959.

Exports of petroleum asphalt and products, exclusive of shipments to Territories and possessions, totaled 148,000 short tons, compared with 197,000 short tons in 1958. Export values of $6 million in 1958 fell to $4.6 million in 1959.

TABLE 73.—Salient statistics of petroleum asphalt in the United States, 1958–59, by months and districts

(Thousand short tons) [1]

Month and district	Production		Imports [2] (including natural)		Exports [2]		Stocks (end of period)		Apparent domestic consumption [4]	
	1958	1959 [3]	1958 [5]	1959 [3]	1958 [5]	1959 [3]	1958	1959 [3]	1958 [5]	1959 [3]
Month:										
January	736	820	101	125	29	13	2,144	2,045	567	661
February	673	796	24	58	15	11	2,413	2,313	414	575
March	818	1,231	83	117	14	13	2,646	2,594	653	1,054
April	1,201	1,395	115	69	18	21	2,854	2,770	1,089	1,267
May	1,537	1,687	101	54	14	17	2,812	2,791	1,666	1,703
June	1,799	1,924	153	166	25	10	2,537	2,587	2,202	2,284
July	1,853	2,094	183	124	32	24	2,235	2,337	2,305	2,444
August	1,961	2,074	100	172	31	13	1,865	2,075	2,401	2,495
September	1,882	1,937	144	133	18	15	1,581	1,816	2,292	2,314
October	1,706	1,713	116	101	28	21	1,337	1,742	2,038	1,867
November	1,263	1,205	101	56	15	13	1,530	1,859	1,156	1,131
December	822	877	139	75	9	17	1,774	1,991	708	809
Total	16,251	17,753	1,360	1,250	248	188	1,774	1,991	17,491	18,598
District:										
East Coast	3,637	3,696					359	357		
Appalachian No. 1	187	224					18	11		
Appalachian No. 2	429	468					37	38		
Indiana, Illinois, Kentucky, etc.	2,959	3,184					358	319		
Minnesota, Wisconsin, North Dakota	154	220					15	41		
Oklahoma, Kansas, etc.	1,715	1,825	(7)	(7)	(7)	(7)	229	346	(7)	(7)
Texas Inland	920	972					81	100		
Texas Gulf Coast	1,100	1,287					80	68		
Louisiana Gulf Coast	859	715					89	84		
Arkansas, Louisiana Inland, etc.	782	863					101	138		
New Mexico	98	93					12	15		
Rocky Mountain	1,154	1,242					172	225		
West Coast	2,257	2,964					223	249		
Total	16,251	17,753	1,360	1,250	248	188	1,774	1,991	17,491	18,598

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Imports into continental United States only.
[3] Excludes shipments to noncontiguous territories.
[4] Production, plus imports, less exports, plus or minus change in stocks.
[5] Preliminary figures.
[6] Revised.
[7] Not available.

Digitized by Google

TABLE 74.—Salient statistics of road oil in the United States, 1958–59, by months and districts

(Short tons) [1]

Month and district	Production		Stocks (end of period)		Apparent domestic consumption [2]	
	1958	1959 [3]	1958	1959 [3]	1958	1959 [3]
Month:						
January	10,181	11,273	88,000	75,274	28,909	11,818
February	28,364	30,909	93,273	98,183	23,091	8,000
March	40,909	56,364	121,091	136,002	13,091	18,545
April	44,000	95,091	133,636	192,184	31,455	38,909
May	137,455	136,727	176,000	239,456	95,091	89,455
June	149,273	179,455	167,818	218,366	157,455	200,545
July	202,909	240,727	162,545	186,184	208,182	272,909
August	209,091	189,818	114,000	149,275	257,636	226,727
September	139,091	113,273	105,091	120,912	148,000	141,636
October	62,727	60,727	76,545	111,455	91,273	70,184
November	32,182	29,818	80,545	108,000	28,182	33,273
December	21,091	36,364	75,819	118,728	25,817	25,636
Total	1,077,273	1,180,546	75,819	118,728	1,108,182	1,137,637
District:						
East Coast	4,364	4,182	727			
Appalachian No. 1	6,364					
Appalachian No. 2	545		182			
Indiana, Illinois, Kentucky, etc.	284,364	300,364	22,365	12,364		
Minnesota, Wisconsin, North Dakota	26,909	27,455				
Oklahoma, Kansas, etc.	224,000	252,000	10,545	27,273	(4)	(4)
Texas Inland						
Texas Gulf Coast	3,091	2,909	545	364		
Louisiana Gulf Coast	727	1,818	364	545		
Arkansas, Louisiana Inland, etc.	2,545	3,273	364	364		
Rocky Mountain	305,091	350,000	20,000	49,091		
West Coast	219,273	238,545	20,727	28,727		
Total	1,077,273	1,180,546	75,819	118,728	1,108,182	1,137,637

[1] Converted from barrels to short tons (5.5 barrels=1 short ton).
[2] Production plus or minus change in stocks.
[3] Preliminary figures.
[4] Not available.

Digitized by Google

TABLE 75.—Sales of petroleum-asphalt paving products in the United States, 1958–59, by districts and States

(Short tons)

District [1] and State	Asphalt cements		Cutback asphalts		Emulsified asphalts		Total	
	1958	1959	1958	1959	1958	1959	1958	1959
District 1:								
Connecticut	115,660	119,252	63,053	56,404	5,319	3,918	184,032	179,574
Delaware	18,827	21,795	29,613	12,848	3,760	82	52,200	34,725
Florida	325,385	340,051	157,561	150,298	32,513	23,446	515,459	513,795
Georgia	241,976	265,392	63,565	81,647	8,810	9,401	314,351	356,440
Maine	27,056	51,775	73,079	62,447	8,271	9,734	108,406	123,956
Maryland and District of Columbia	159,083	173,186	102,883	74,286	25,707	18,628	287,673	266,100
Massachusetts	222,417	275,254	55,246	55,091	150	711	277,813	331,056
New Hampshire	27,548	31,803	56,903	48,674	82	51	84,533	80,528
New Jersey	205,720	265,158	114,234	112,366	16,582	20,324	336,536	397,848
New York	431,743	496,790	194,860	235,747	99,746	129,590	726,349	862,127
North Carolina	196,147	162,063	111,574	75,010	38,922	58,989	346,643	296,062
Pennsylvania	303,358	359,721	169,128	161,358	24,637	48,336	497,123	569,415
Rhode Island	42,653	41,450	35,285	43,484	774	58	78,712	84,992
South Carolina	107,415	136,774	35,906	37,694	4,388	16,410	147,709	190,878
Vermont	11,793	11,669	24,562	23,279	665	1,062	37,020	36,010
Virginia	180,968	170,233	121,863	109,164	5,080	8,891	307,911	288,288
West Virginia	56,172	57,914	23,811	23,755	2,059	2,873	82,042	84,542
Total	2,673,921	2,980,280	1,433,126	1,363,552	277,465	352,504	4,384,512	4,696,336
District 2:								
Illinois	344,855	346,886	129,205	160,650	11,610	9,808	485,670	517,344
Indiana	126,602	150,683	137,357	123,518	101,158	111,841	365,117	386,042
Iowa	164,801	209,995	101,326	102,282	45,313	44,663	311,440	356,940
Kansas	133,556	117,883	233,607	278,276	115	143	367,278	396,302
Kentucky	134,460	176,094	108,413	112,034	23,154	18,162	266,027	306,290
Michigan	252,039	268,084	76,803	105,015	58,459	53,378	387,301	426,477
Minnesota	141,622	148,219	264,042	208,485	14,625	16,596	420,289	373,300
Missouri	109,667	112,285	163,134	192,032	15,568	8,221	288,369	312,538
Nebraska	61,121	50,002	53,412	91,021	58	60	114,591	141,083
North Dakota	116,192	68,546	75,899	76,346	56,018	66,299	248,109	211,191
Ohio	371,868	443,672	301,664	333,994	114,710	116,970	788,242	894,636
Oklahoma	138,318	153,405	161,234	130,735	2,766	904	302,318	285,044
South Dakota	51,122	83,520	36,580	45,819	42	11,917	87,744	141,256
Tennessee	172,842	215,132	97,232	108,692	17,161	17,528	287,235	341,352
Wisconsin	140,523	208,079	107,611	106,685	10,419	4,125	258,553	318,889
Total	2,459,588	2,752,485	2,047,519	2,175,584	471,176	480,615	4,978,283	5,408,684
District 3:								
Alabama	144,663	154,758	78,756	78,335	38,591	26,492	262,010	259,585
Arkansas	51,380	63,717	17,953	42,420	7,702	19,383	77,035	125,520
Louisiana	180,841	228,839	30,586	23,046	27,173	25,280	238,600	277,165
Mississippi	90,039	82,905	22,885	24,606	20,115	19,337	133,039	126,848
New Mexico	127,021	113,090	65,915	71,955	7,068	10,160	200,004	195,205
Texas	585,067	742,266	166,275	214,517	31,631	35,849	782,973	992,632
Total	1,179,011	1,385,575	382,370	454,879	132,280	136,501	1,693,661	1,976,955
District 4:								
Colorado	164,386	162,645	71,119	63,406	265	352	235,770	226,403
Idaho	20,885	33,716	30,637	38,765	22	2,101	51,544	74,582
Montana	36,518	63,674	48,931	53,177	7,656	6,895	93,135	123,746
Utah	66,783	78,502	64,653	53,323	1	5	131,437	131,830
Wyoming	58,660	39,470	34,198	32,726	7	2,902	92,865	75,098
Total	347,232	378,007	249,538	241,397	7,981	12,255	604,751	631,659
District 5:								
Alaska	(2)	4,255	(2)	1,268	(2)	----------	(2)	5,523
Arizona	44,517	51,401	22,418	35,966	14,515	14,102	81,450	101,469
California	966,353	1,047,627	116,502	134,745	113,065	117,993	1,195,920	1,300,365
Nevada	17,762	27,243	9,380	10,051	3,780	3,788	30,922	41,082
Oregon	133,007	162,792	37,479	36,899	3,522	9,564	174,008	209,255
Washington	135,436	124,785	103,575	79,896	1,332	4,726	240,343	209,407
Total	1,297,075	1,418,103	289,354	298,825	136,214	150,173	1,722,643	1,867,101
Total United States	7,956,827	8,914,450	4,401,907	4,534,237	1,025,116	1,132,048	13,383,850	14,580,735

[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.

[2] Not included in the U.S. total before 1959.

Digitized by Google

TABLE 76.—Sales of petroleum-asphalt roofing products in the United States, 1958–59, by districts and States

(Short tons)

District [1] and State	Asphalt cements and fluxes		Emulsified asphalts		Total	
	1958	1959	1958	1959	1958	1959
District 1:						
Connecticut	18,475	20,491	74	24	18,549	20,515
Delaware	1,399	1,530	186	184	1,585	1,714
Florida	84,866	98,006	30	15	84,896	98,021
Georgia	132,756	110,215	1,806	23	134,562	110,238
Maine						
Maryland and District of Columbia	49,946	43,080	201	90	50,147	43,170
Massachusetts	54,277	57,310	94	88	54,371	57,398
New Hampshire	71	8	25	25	96	28
New Jersey	323,229	301,090	138	139	323,367	301,229
New York	51,804	44,645	419	364	52,223	45,009
North Carolina	30,774	44,399	3		30,777	44,399
Pennsylvania	114,469	138,232	452	471	114,921	138,703
Rhode Island	49,687	39,860	35	16	49,722	39,876
South Carolina	38,578	48,018		570	38,578	48,588
Vermont	141	46	11	6	152	52
Virginia	4,389	4,532	47	44	4,436	4,576
West Virginia	38,537	41,454	37		38,574	41,454
Total	993,398	992,911	3,558	2,059	996,956	994,970
District 2:						
Illinois	505,467	500,207	91	81	505,558	500,288
Indiana	85,984	89,389	48	116	86,032	89,505
Iowa	5,588	11,008	39		5,627	11,008
Kansas	13,514	22,570			13,514	22,570
Kentucky	1,622	2,117	7	97	1,629	2,214
Michigan	42,011	54,150	213	327	42,224	54,477
Minnesota	108,500	115,621	53	86	108,553	115,707
Missouri	143,188	163,120			143,188	163,120
Nebraska	5,270	6,351			5,270	6,351
North Dakota	1,820	1,457			1,820	1,457
Ohio	54,819	61,503	3,036	3,163	57,855	64,666
Oklahoma	362	327			362	327
South Dakota	2,271	1,510			2,271	1,510
Tennessee	28,595	48,674		1	28,595	48,675
Wisconsin	4,645	14,619	129	251	4,774	14,870
Total	1,003,656	1,092,623	3,616	4,122	1,007,272	1,096,745
District 3:						
Alabama	113,893	122,162	4	44	113,897	122,206
Arkansas	38,184	57,837			38,184	57,837
Louisiana	119,826	146,721			119,826	146,721
Mississippi	9,590	10,263			9,590	10,263
New Mexico	11,439	11,981			11,439	11,981
Texas	237,883	243,885			237,883	243,885
Total	530,815	592,849	4	44	530,819	592,893
District 4:						
Colorado	22,603	23,906			22,603	23,906
Idaho	1,521	4,792			1,521	4,792
Montana	3,476	3,367			3,476	3,367
Utah	5,951	6,785	1	2	5,952	6,787
Wyoming	2,793	3,364			2,793	3,364
Total	36,344	42,214	1	2	36,345	42,216
District 5:						
Alaska	(2)	1,258	(2)		(2)	1,258
Arizona	20	711			20	711
California	410,540	437,877	71	104	410,611	437,981
Nevada	333	150			333	150
Oregon	90,842	99,855	45	5	90,887	99,860
Washington	27,933	32,148	11	6	27,944	32,154
Total	529,668	571,999	127	115	529,795	572,114
Total United States	3,093,881	3,292,596	7,306	6,342	3,101,187	3,298,938

[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[2] Not included in the U.S. total before 1959.

Digitized by Google

TABLE 77.—Sales of all other petroleum-asphalt products in the United States, 1958–59, by districts and States

(Short tons)

District[1] and State	Asphalt cements and fluxes		Emulsified asphalts		Total	
	1958	1959	1958	1959	1958	1959
District 1:						
Connecticut	13,928	12,088	741	406	14,669	12,494
Delaware	674	2,117	11	15	685	2,132
Florida	108,251	106,219	255	1,873	108,506	108,092
Georgia	15,942	56,049	281	1,970	16,223	58,019
Maine	4,610	4,797	74	374	4,684	5,171
Maryland and District of Columbia	15,160	19,549	1,413	1,238	16,573	20,787
Massachusetts	41,691	54,111	1,038	1,396	42,729	55,507
New Hampshire	122	460	24	31	146	491
New Jersey	185,614	236,745	3,349	3,453	188,963	240,198
New York	32,590	40,506	2,493	2,307	35,083	42,813
North Carolina	58,889	70,708	897	319	59,786	71,027
Pennsylvania	170,734	157,332	1,910	2,963	172,644	160,295
Rhode Island	9,673	7,642	184	171	9,857	7,813
South Carolina	1,108	1,243	675	93	1,783	1,336
Vermont	1,645	2,572	7	16	1,652	2,588
Virginia	21,468	18,944	157	347	21,625	19,291
West Virginia	30,623	18,505	31	145	30,654	18,650
Total	712,722	809,587	13,540	17,117	726,262	826,704
District 2:						
Illinois	218,374	225,991	10,838	8,900	229,212	234,891
Indiana	93,861	105,014	293	332	94,154	105,346
Iowa	4,880	6,347	699	37	5,579	6,384
Kansas	14,819	12,994	161	6	14,980	13,000
Kentucky	861	958	626	992	1,487	1,950
Michigan	19,431	27,870	3,954	5,258	23,385	33,128
Minnesota	33,272	31,255	1,085	90	34,357	31,345
Missouri	51,816	46,905	1,770	1,025	53,586	47,930
Nebraska	2,413	3,242	13	5	2,426	3,247
North Dakota	4,191	4,813	18		4,209	4,813
Ohio	86,438	100,630	3,744	4,237	90,182	104,876
Oklahoma	14,325	14,010	33	34	14,358	14,044
South Dakota	299	55	74		373	55
Tennessee	21,038	17,795	59	152	21,097	17,947
Wisconsin	47,955	45,742	934	126	48,889	45,868
Total	613,973	643,630	24,301	21,194	638,274	664,824
District 3:						
Alabama	9,503	15,747	1,945	585	11,448	16,332
Arkansas	994	7,463	2,982	202	3,976	7,665
Louisiana	48,911	70,869	3,113	3,119	52,024	73,988
Mississippi	13,486	17,471	727	758	14,213	18,229
New Mexico	1,630	2,501	10	39	1,640	2,540
Texas	75,015	92,602	1,897	2,515	76,912	95,117
Total	149,539	206,653	10,674	7,218	160,213	213,871
District 4:						
Colorado	9,398	7,948	391	353	9,789	8,301
Idaho	443	425	56	44	499	469
Montana	582	2,611	7	27	589	2,638
Utah	4,012	1,629	31	54	4,043	1,683
Wyoming	4,953	4,057	17	8	4,970	4,065
Total	19,388	16,670	502	486	19,890	17,156
District 5:						
Alaska	[2]	1,555	[2]		[2]	1,555
Arizona	1,789	1,765	117	195	1,906	1,960
California	121,938	140,613	6,447	6,511	128,385	147,124
Nevada	421	306	8	23	429	329
Oregon	4,703	6,991	1,841	1,910	6,544	8,901
Washington	10,252	11,239	1,907	1,252	12,159	12,491
Total	139,103	162,469	10,320	9,891	149,423	172,360
Total United States	1,634,725	1,839,009	59,337	55,906	1,694,062	1,894,915

[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[2] Not included in the U.S. total before 1959.

Digitized by Google

TABLE 78.—Sales of petroleum asphalts and road oil in the United States, 1958–59, by districts and States

(Short tons)

District [1] and State	Asphalt cements and fluxes	Emulsified asphalts	Cutback asphalts	Total 1959	Total 1958	Percent change	Road oil		Percent change
							1959	1958	
District 1:									
Connecticut	151,831	4,348	56,404	212,583	217,250	−2.2	----------	37	----------
Delaware	25,442	281	12,848	38,571	54,470	−29.2	83	116	−28.5
Florida	544,276	25,334	150,298	719,908	708,861	1.6	----------	----------	----------
Georgia	431,656	11,394	81,647	524,697	465,136	12.8	----------	----------	----------
Maine	56,572	10,108	62,447	129,127	113,090	14.2	1,484	1,117	32.9
Maryland and District of Columbia	235,815	19,956	74,286	330,057	354,393	−6.9	534	680	−21.5
Massachusetts	386,675	2,195	55,091	443,961	374,913	18.4	755	685	10.2
New Hampshire	32,266	107	48,674	81,047	84,775	−4.4	----------	----------	----------
New Jersey	802,993	23,916	112,366	939,275	848,866	10.7	2,838	1,278	122.1
New York	581,941	132,261	235,747	949,949	813,655	16.8	336	5,842	−94.3
North Carolina	277,170	59,308	75,010	411,488	437,206	−5.9	----------	701	----------
Pennsylvania	655,285	51,770	161,358	868,413	784,688	10.7	9,970	7,295	36.7
Rhode Island	88,952	245	43,484	132,681	138,291	−4.1	9	105	−91.4
South Carolina	186,035	17,073	37,694	240,802	188,070	28.0	14	----------	----------
Vermont	14,287	1,084	23,279	38,650	38,824	−0.5	----------	----------	----------
Virginia	193,709	9,282	109,164	312,155	333,972	−6.5	----------	----------	----------
West Virginia	117,873	3,018	23,755	144,646	151,270	−4.4	467	78	498.7
Total 1959	4,782,778	371,680	1,363,552	6,518,010	----------	6.7	16,490	----------	−8.1
Total 1958	4,380,041	294,563	1,433,126	----------	6,107,730	----------	----------	17,934	----------
District 2:									
Illinois	1,073,084	18,789	160,650	1,252,523	1,220,440	2.6	232,541	197,637	17.7
Indiana	345,086	112,289	123,518	580,893	545,303	6.5	30,910	30,557	1.2
Iowa	227,350	44,700	102,282	374,332	322,646	16.0	36,564	30,525	19.8
Kansas	153,447	149	278,276	431,872	395,772	9.1	3,459	9,748	−64.5
Kentucky	179,169	19,251	112,034	310,454	269,143	15.3	10,637	16,374	−35.0
Michigan	350,104	58,963	105,015	514,082	452,910	13.5	24,873	24,843	0.1
Minnesota	295,095	16,772	208,485	520,352	563,199	−7.6	17,884	14,542	23.0
Missouri	322,310	9,246	192,032	523,588	485,143	7.9	83,944	98,316	−14.6
Nebraska	59,595	65	91,021	150,681	122,287	23.2	2,725	3,992	−31.7
North Dakota	74,816	66,299	76,346	217,461	254,138	−14.4	8,060	7,521	7.2
Ohio	605,814	124,370	333,994	1,064,178	936,279	13.7	20,137	22,170	−9.2
Oklahoma	167,742	938	130,735	299,415	317,038	−5.6	2,482	5,236	−52.6
South Dakota	85,085	11,917	45,819	142,821	90,388	58.0	25,993	23,348	11.3
Tennessee	281,601	17,681	108,692	407,974	336,927	21.1	----------	1	----------
Wisconsin	268,440	4,502	106,685	379,627	312,216	21.6	130,256	124,486	4.6
Total 1959	4,488,738	505,931	2,175,584	7,170,253	----------	8.2	630,465	----------	3.5
Total 1958	4,077,217	499,093	2,047,519	----------	6,623,829	----------	----------	609,296	----------

See footnotes at end of table.

Digitized by Google

TABLE 78.—Sales of petroleum asphalts and road oil in the United States, 1958–59, by districts and States—Continued

(Short tons)

District [1] and State	Asphalt cements and fluxes	Emulsified asphalts	Cutback asphalts	Total 1959	Total 1958	Percent change	Road oil		Percent change
							1959	1958	
District 3:									
Alabama	292,667	27,121	78,335	398,123	387,355	2.8	37	67	−44.8
Arkansas	129,017	19,585	42,420	191,022	119,195	60.3	----------	500	----------
Louisiana	446,429	28,399	23,046	497,874	410,450	21.3	----------	1,182	----------
Mississippi	110,639	20,095	24,606	155,340	156,842	−1.0	----------	15	----------
New Mexico	127,572	10,199	71,955	209,726	213,083	−1.6	4,925	6,997	−29.6
Texas	1,078,753	38,364	214,517	1,331,634	1,097,768	21.3	41,008	39,539	3.7
Total 1959	2,185,077	143,763	454,879	2,783,719	----------	16.7	45,970	----------	−4.8
Total 1958	1,859,365	142,958	382,370	----------	2,384,693	----------	----------	48,300	----------
District 4:									
Colorado	194,499	705	63,406	258,610	268,162	−3.6	21,486	19,125	12.3
Idaho	38,933	2,145	38,765	79,843	53,564	49.1	20,264	20,915	−3.1
Montana	69,652	6,922	53,177	129,751	97,200	33.5	9,850	12,034	−18.2
Utah	86,916	61	53,323	140,300	141,432	−0.8	16,769	18,085	−7.3
Wyoming	46,891	2,910	32,726	82,527	100,628	−18.0	22,451	25,936	−13.4
Total 1959	436,891	12,743	241,397	691,031	----------	4.5	90,820	----------	−5.5
Total 1958	402,964	8,484	249,538	----------	660,986	----------	----------	96,095	----------
District 5:									
Alaska	7,068	----------	1,268	8,336	[2]	----------	----------	[2]	----------
Arizona	53,877	14,297	35,966	104,140	83,376	24.9	4,125	4,887	−15.6
California	1,626,117	124,608	134,745	1,885,470	1,734,916	8.7	332,979	353,293	−5.8
Nevada	27,699	3,811	10,051	41,561	31,684	31.2	17,788	22,573	−21.2
Oregon	269,638	11,479	36,899	318,016	271,439	17.2	1,733	4,982	−65.2
Washington	168,172	5,984	79,896	254,052	280,446	−9.4	2,472	7,616	−67.6
Total 1959	2,152,571	160,179	298,825	2,611,575	----------	8.7	359,097	----------	−8.7
Total 1958	1,965,846	146,661	289,354	----------	2,401,861	----------	----------	393,351	----------
U.S., total 1959	14,046,055	1,194,296	4,534,237	19,774,588	----------	8.8	1,142,842	----------	−1.9
U.S., total 1958	12,685,433	1,091,759	4,401,907	----------	18,179,099	----------	----------	1,164,976	----------

[1] States are grouped according to petroleum-marketing districts rather than conventional geographic regions.
[2] Not included in the U.S. total before 1959.

Digitized by Google

OTHER PRODUCTS

Wax.—The total demand for wax in 1959 was 5.6 million barrels compared with 5.2 million in 1958. Domestic demand increased 6 percent and exports 13.4 percent. Wax is used primarily for waterproofing paper products and for candles.

Coke.—Production of petroleum coke in 1959 was 41.1 million barrels—8.8 percent above 1958. This includes 17.7 million barrels of nonmarketable catalyst coke which forms on the catalyst in cracking operations and must be burned off at the plant. The heat generated in burning it is used as refinery fuel.

Total demand for petroleum coke increased 13.2 percent in 1959. Domestic demand was 35.6 million barrels, and exports were 4.7 million barrels. Coke with a low sulfur content is used in making the electrodes required in the electrolic production of aluminum.

TABLE 79.—Salient statistics of wax in the United States, 1958–59, by types, months, and districts

(Thousand barrels)[1]

	1958										
	Production				Imports (all types)	Exports (all types)	Stocks end of period				Domestic demand (all types)
	Microcrystalline	Fully refined	Other	Total			Microcrystalline	Fully refined	Other	Total	
By months:											
January	47	171	222	440	-------	62	128	308	266	702	342
February	48	159	182	389	-------	59	116	298	280	694	338
March	66	204	175	445	-------	73	112	325	282	719	347
April	83	170	183	436	-------	65	121	316	284	721	369
May	67	159	199	425	-------	78	118	329	288	735	333
June	67	163	215	445	-------	66	123	337	283	743	371
July	57	171	162	390	-------	82	117	288	287	692	359
August	62	200	160	422	-------	72	120	276	303	699	343
September	77	203	195	475	-------	84	121	256	331	708	382
October	81	223	151	455	-------	85	118	243	304	665	413
November	71	216	187	474	2	86	130	263	340	733	322
December	55	224	177	456	3	99	129	247	336	712	381
Total	781	2,263	2,208	5,252	5	911	129	247	336	712	4,300
By districts:											
East Coast	308	764	542	1,614	(2)	(2)	28	64	37	129	(2)
Appalachian #1	12	45	263	320			10	28	13	51	
Appalachian #2	-------	37	32	69			-------	6	-------	6	
Indiana, Illinois, Kentucky, etc.	18	186	35	239			1	10	6	17	
Oklahoma, Kansas, etc.	333	97	341	771			57	6	75	138	
Texas Inland	-------	-------	37	37			-------	-------	26	26	
Texas Gulf Coast	65	669	361	1,095			23	36	101	160	
Louisiana Gulf Coast	40	8	578	626			6	5	56	67	
Rocky Mountain	-------	43	19	62			4	8	22	34	
West Coast	5	414	-------	419			-------	84	-------	84	
Total	781	2,263	2,208	5,252	-------	-------	129	247	336	712	-------

See footnotes at end of table.

Digitized by Google

TABLE 79.—Salient statistics of wax in the United States, 1958–59, by types, months, and districts—Continued

(Thousand barrels) [1]

	1959 [2]										
	Production				Imports (all types)	Exports (all types)	Stocks end of period				Domestic demand (all types)
	Microcrystalline	Fully refined	Other	Total			Microcrystalline	Fully refined	Other	Total	
By months:											
January	59	252	188	499	1	72	124	255	335	714	426
February	58	203	147	408	-------	82	118	272	293	683	357
March	76	234	156	466	2	96	116	282	286	684	371
April	57	251	198	506	1	85	110	285	320	715	391
May	77	199	197	473	3	92	112	293	336	741	358
June	61	208	197	466	-------	95	100	291	330	721	391
July	73	203	154	430	1	82	98	284	319	701	369
August	60	222	164	446	5	75	100	284	327	711	366
September	72	241	156	469	2	93	105	284	320	709	380
October	79	228	147	454	3	76	131	278	288	697	393
November	94	224	147	465	2	85	138	297	285	720	359
December	75	257	216	548	1	100	131	309	334	774	395
Total	841	2,722	2,067	5,630	21	1,033	131	309	334	774	4,556
By districts:											
East Coast	230	1,217	463	1,910			26	74	117	217	
Appalachian #1	14	43	278	335			11	42	15	68	
Appalachian #2	-------	35	29	64			-------	9	-------	9	
Indiana, Illinois, Kentucky, etc.	29	209	62	300			1	8	10	19	
Oklahoma, Kansas, etc.	372	29	227	628	(3)	(3)	39	7	33	79	(3)
Texas Inland	15	-------	26	41			25	-------	-------	25	
Texas Gulf Coast	136	567	417	1,120			19	31	107	157	
Louisiana Gulf Coast	40	29	557	626			7	11	35	53	
Rocky Mountain	5	55	8	68			3	9	17	29	
West Coast	-------	538	-------	538			-------	118	-------	118	
Total	841	2,722	2,067	5,630	-------	-------	131	309	334	774	-------

[1] Conversion factor: 280 pounds to the barrel.
[2] Preliminary figures.
[3] Figures not available.

TABLE 80.—Average monthly refinery prices of 124°–126° white crude scale wax at Pennsylvania refineries, 1955–59, in cents per pound

[Platt's Oil Price Handbook]

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for year
1955	5.45	5.45	5.45	5.45	5.45	5.45	5.45	5.45	5.45	5.45	5.45	5.68	5.47
1956	5.91	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.03	6.25	6.02
1957	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1958	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
1959	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25

Digitized by Google

TABLE 81.—Salient statistics of petroleum coke in the United States, 1958–59, by months and districts[1]

(Thousand barrels unless otherwise stated)

	Production		Yields (percent)		Domestic demand		Exports		Stocks, end of period	
	1958	1959[2]	1958	1959[2]	1958	1959[2]	1958	1959[2]	1958	1959[2]
By months:										
January	3,229	3,413	1.3	1.3	2,661	2,827	307	431	2,795	4,973
February	2,802	3,182	1.3	1.3	2,292	2,751	426	197	2,879	5,207
March	2,960	3,679	1.3	1.4	2,389	3,111	338	304	3,112	5,471
April	3,137	3,083	1.4	1.3	2,414	2,751	488	334	3,347	5,469
May	3,323	3,466	1.5	1.4	2,711	2,895	317	383	3,642	5,657
June	2,964	3,620	1.5	1.5	2,650	2,952	331	433	3,625	5,892
July	3,191	3,314	1.3	1.4	2,383	2,755	457	436	3,976	6,015
August	3,187	3,349	1.3	1.3	2,655	3,030	403	407	4,105	5,927
September	3,021	3,425	1.3	1.4	2,654	3,089	246	447	4,226	5,816
October	3,324	3,415	1.4	1.4	2,722	3,253	416	496	4,412	5,482
November	3,237	3,360	1.4	1.4	2,661	2,919	333	354	4,655	5,569
December	3,433	3,811	1.3	1.5	2,927	3,217	343	458	4,818	5,705
Total	[3]37,808	[4]41,117	1.3	1.4	31,119	35,550	4,405	4,680	4,818	5,705
By districts:										
East Coast	4,239	7,611	1.0	1.7					643	1,100
Appalachian No. 1	37	--	.1	--					--	--
Appalachian No. 2	385	351	1.1	.9					--	--
Indiana, Illinois, Kentucky, etc.	11,457	11,698	2.3	2.2					1,021	1,060
Minnesota, Wisconsin, etc.	1,341	1,373	3.7	3.6					227	315
Oklahoma, Kansas, etc.	6,072	5,438	2.3	2.1	(5)	(5)	(5)	(5)	299	194
Texas Inland	429	424	.4	.4					69	66
Texas Gulf Coast	3,013	3,840	.5	.6					--	--
Louisiana Gulf Coast	3,449	2,763	1.4	1.1					24	19
Arkansas, Louisiana Inland, etc.	1,316	1,073	3.7	3.3					303	673
Rocky Mountain	1,604	1,647	1.6	1.6					456	566
West Coast	4,466	4,899	1.1	1.2					1,776	1,712
Total	[3]37,808	[4]41,117	1.3	1.4	--	--	--	--	4,818	5,705

[1] Conversion factor: 5.0 barrels to the short ton.
[2] Preliminary figures.
[3] Includes 15,188,000 barrels of nonmarketable catalyst coke.
[4] Includes 17,722,000 barrels of nonmarketable catalyst coke.
[5] Figures not available.

Still Gas.—Production of still gas in 1959 totaled 128 million barrels (754 billion cubic feet). The average heating value of still gas, based on 6 million B.t.u. per barrel equivalent, has been declining for several years. Improved refining techniques are producing more liquid hydrocarbons from this gas. A cubic foot of still gas averaged 1,019 B.t.u. in 1959, compared with 1,050 in 1958 and 1,279 in 1953.

Refiners used 743.1 billion cubic feet of still gas as refinery fuel in 1959.

Miscellaneous Oils.—Output of miscellaneous finished oils was 23.5 million barrels in 1959—21.8 million barrels produced at refineries and 1.7 million barrels at natural gasoline plants. The demand for these oils increased 20.8 percent.

Table 83 shows a breakdown of the various types of miscellaneous oils produced. Some products included in the "Other" category and the 1959 production figures for those products are: Petrochemicals, 4,137,000 barrels; aromatic oils, 3,211,000; chemical products, 788,000; butyl rubber, 614,000; and sulfur, 593,000.

Digitized by Google

TABLE 82.—Production of still gas in the United States, 1957–59, by districts

District	1957		1958		1959 [1]	
	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels	Million cubic feet	Equivalent in thousand barrels
East Coast	76,771	14,754	89,405	16,089	95,747	16,648
Appalachian No. 1	9,512	1,977	8,686	1,807	10,173	1,813
Appalachian No. 2	8,398	1,907	10,289	2,070	12,217	1,984
Indiana, Illinois, Kentucky, etc.	144,104	26,872	149,069	26,642	152,011	25,821
Minnesota, Wisconsin, North Dakota, and South Dakota	6,044	1,093	6,783	1,124	7,480	1,224
Oklahoma, Kansas, etc.	59,529	11,187	63,193	11,141	63,002	10,568
Texas Inland	27,483	5,244	28,891	5,790	29,769	5,203
Texas Gulf Coast	158,710	26,947	156,925	24,466	160,752	25,795
Louisiana Gulf Coast	56,965	10,120	54,658	8,864	48,432	7,468
Arkansas, Louisiana Inland, etc.	5,223	1,200	4,947	1,375	6,720	1,215
New Mexico	994	216	916	189	1,055	187
Rocky Mountain	22,484	4,676	21,164	4,507	25,186	4,543
West Coast	109,617	19,428	124,915	21,887	141,242	25,517
Total	685,834	125,720	719,841	125,951	753,786	127,986

[1] Preliminary figures.

Unfinished Oils.—Unfinished oils include all oils requiring cracking or further distillation, except the unfinished gasoline portion of naphtha distillate. Unfinished oils are ordinarily rerun and become finished products.

TABLE 83.—Production of miscellaneous finished oils in the United States in 1959, by districts and classes

(Thousand barrels)

District	Petrolatum	Medicinal oil	Absorption oil	Specialties oil	Solvents	Other	Total
East Coast		21		83	424	2,828	3,356
Appalachian No. 1	79	31		86	327		523
Appalachian No. 2				27			27
Indiana, Illinois, Kentucky, etc.	52		24	370	388	1,067	1,901
Minnesota, Wisconsin, North Dakota, and South Dakota						65	65
Oklahoma, Kansas, etc.	479		98	218	210	223	1,228
Texas Inland			758	4	395	256	1,413
Texas Gulf Coast	373		49	373	3,126	1,880	5,801
Louisiana Gulf Coast	9		259	56	75	3,149	3,548
Arkansas-Louisiana Inland			547		48	10	605
Rocky Mountain and New Mexico			74	65		381	520
West Coast	19	41	46	664	231	3,538	4,539
Total	1,011	93	1,855	1,946	5,224	13,397	23,526

INTERCOASTAL SHIPMENTS

Crude oil and products moved from the gulf coast to the east coast comprise the bulk of intercoastal shipments. Some petroleum shipments are moved from the west coast to the east coast and from the gulf coast to the west coast, but the volume is small.

Shipments from the gulf coast to the east coast totaled 667.7 million barrels in 1959, a 0.9-percent increase over 1958. Residual-fuel-oil shipments were 8.6 percent less than in 1958, but shipments of crude oil and all other products increased.

Digitized by Google

TABLE 84.—Petroleum oils, crude and refined, shipped commercially from gulf-coast to East-coast ports of the United States, 1958–59 by classes [1]

(Thousand barrels)

Year and class	January	February	March	April	May	June	July	August	September	October	November	December	Total
1958													
Crude petroleum	15,005	12,861	14,663	13,169	13,268	11,712	11,803	14,271	14,679	13,959	14,216	14,603	164,209
Gasoline	16,650	16,039	20,353	17,627	19,669	18,811	19,158	18,527	19,936	20,314	19,213	17,766	224,063
Kerosine	4,885	5,283	3,347	2,454	2,116	2,457	2,561	2,794	2,461	3,713	4,249	5,170	41,490
Distillate fuel oil	17,554	15,407	15,403	12,875	11,432	10,795	12,151	10,358	12,176	13,374	15,425	20,203	167,153
Residual fuel oil	4,539	4,122	4,696	4,524	2,905	2,099	3,344	4,132	3,731	4,321	4,545	4,569	47,527
Lubricating oils	448	516	786	559	626	575	586	637	834	721	739	750	7,777
Miscellaneous oils	595	523	1,115	618	595	898	793	964	797	902	1,154	699	9,653
Total	59,676	54,751	60,363	51,826	50,611	47,347	50,396	51,683	54,614	57,304	59,541	63,760	661,872
1959													
Crude petroleum	18,081	17,949	17,769	15,702	10,462	8,826	14,740	14,945	10,737	10,677	12,694	14,205	166,787
Gasoline	17,042	17,027	17,777	21,094	19,878	21,636	21,073	21,600	17,542	17,692	17,856	19,071	229,228
Kerosine	6,154	3,799	2,782	2,355	2,263	2,420	3,662	3,467	2,972	3,452	4,076	4,775	42,177
Distillate fuel oil	20,085	16,712	16,529	13,352	12,800	11,893	10,869	12,714	10,540	10,721	14,186	17,418	167,819
Residual fuel oil	3,501	3,392	2,880	3,725	3,570	2,867	3,067	3,152	3,635	4,106	4,508	5,027	43,430
Lubricating oils	604	430	641	743	746	667	749	530	638	827	673	663	7,911
Miscellaneous oils	718	604	720	874	1,008	904	516	1,340	1,404	561	689	985	10,323
Total	66,185	59,913	59,098	57,845	50,707	49,213	54,676	57,748	47,468	48,036	54,662	62,124	667,655

[1] Source: Office of Oil and Gas, U.S. Department of the Interior.

Digitized by Google

FOREIGN TRADE

Foreign-trade statistics in this section, as reported by the U.S. Department of Commerce, differ slightly from those used in other sections of this chapter. Bureau of Mines statistics on petroleum imports before 1959 pertained to the 48 States but included Alaska in 1959, and its export statistics include not only foreign countries but also shipments to Territories. Imports of crude petroleum and unfinished oils (table 85) are obtained by the Bureau of Mines from petroleum companies to balance refinery reports; therefore, they differ from the totals reported by the U.S. Department of Commerce.

Imports.—According to U.S. Department of Commerce data, imports totaled 672.2 thousand barrels in 1959, a 3.1-percent increase over 1958. Crude imports declined 0.5 percent, and imports of refined products increased 8.1 percent.

In March 1959, Presidential Proclamation No. 3279 placed imports of crude petroleum and petroleum products into the United States under mandatory controls, replacing the Voluntary Oil Import Control Program. Quotas for crude petroleum and unfinished oils for further refining were based on total demand for crude petroleum and petroleum products. Quotas for imports of refined petroleum products were based on the level of these imports in 1957. Imports from Canada and Mexico received by pipeline were exempted from the mandatory controls. Also exempted were distillate fuel oils and residual fuel oils imported for use in bunkering vessels engaged in foreign trade, for offshore military use, and imported in bond for manufacturing and reexport.

Exports.—Total exports, excluding shipments to the Territories, declined 12.1 million barrels in 1959. Exports of gasoline declined 4.9 million barrels, distillate fuel oil 4.4 million, crude oil 1.8 million, and residual fuel oil 1.5 million.

Digitized by Google

TABLE 85.—Petroleum oils, crude and refined, imported into the United States, 1958–59, by months[1]

(Thousand barrels)

Year and class	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1958													
Crude petroleum	31,747	23,232	31,366	25,835	28,972	28,802	26,916	29,865	29,927	28,885	29,026	33,434	[2] 348,007
Refined products:													
Gasoline	520	434	700	1,091	1,163	1,809	1,677	1,385	960	865	1,083	2,086	13,773
Kerosine			17						17				34
Distillate fuel oil	941	1,009	566	1,217	984	1,172	1,849	1,304	1,663	1,272	1,144	1,771	14,892
Residual fuel oil	20,555	17,516	15,097	16,693	12,619	10,581	12,367	11,119	9,900	16,530	15,894	23,165	182,036
Jet fuel	2,011	1,712	1,808	2,678	728	1,760	2,135	774	2,051	2,350	1,090	1,713	20,810
Wax											2	3	5
Asphalt	555	134	457	632	557	843	1,005	551	790	637	554	768	7,478
Unfinished oils	309	601	451	834	1,996	4,175	4,065	3,530	4,639	4,094	4,283	4,577	33,554
Total refined	24,891	21,406	19,096	23,145	18,047	20,340	23,098	18,663	20,020	25,748	24,050	34,078	272,582
Total crude and refined	56,638	44,638	50,462	48,980	47,019	49,142	50,014	48,528	49,947	54,633	53,076	67,512	[2] 620,589
1959[3]													
Crude petroleum	28,664	29,467	28,113	22,270	29,089	36,147	27,510	29,943	29,486	30,355	29,421	31,879	352,344
Refined products:													
Gasoline	858	1,210	2,283	838	417	1,367	422	534	908	830	1,489	1,635	12,791
Kerosine			113						1				114
Distillate fuel oil	1,556	1,585	3,467	1,877	811	1,841	1,055	818	1,181	675	822	1,789	17,477
Residual fuel oil	26,153	26,354	31,409	14,984	13,861	14,671	11,272	11,764	15,312	13,487	21,050	22,938	223,255
Jet fuel	2,298	1,215	851	1,307	480	515	952	697	2,285	656	994	1,432	13,682
Wax	1		2	1	3		1	5	2	3	2	1	21
Asphalt	690	319	643	379	295	914	681	945	730	554	308	411	6,869
Miscellaneous												4	4
Unfinished oils	4,681	5,795	1,870	698	1,018	1,611	2,024	1,387	1,242	1,079	793	874	23,072
Total refined	36,237	36,478	40,638	20,084	16,885	20,919	16,407	16,150	21,661	17,284	25,458	29,084	297,285
Total crude and refined	64,901	65,945	68,751	42,354	45,974	57,066	43,917	46,093	51,147	47,639	54,879	60,963	649,629

[1] Imports of crude reported to the Bureau of Mines; imports of refined products compiled from records of the U.S. Department of Commerce.

[2] Excludes 29,000 barrels from Alaska.

[3] Preliminary figures.

Digitized by Google

TABLE 86.—Crude petroleum and petroleum products imported for consumption into the United States, 1958–59, by country, in thousand barrels [1]

[Bureau of the Census]

Country	Crude petroleum	Gasoline [2]	Kerosine	Distillate oils [3]	Residual oil [3]	Asphalt	Unfinished oil	Miscellaneous oils [4]	Total
1958									
North America:									
Canada	30,621	748	17	154	362	34	33	(5)	31,969
Mexico	999	-------	-------	-------	11,070	-------	-------	6	12,075
Netherlands Antilles	[6] 1,428	[6] 22,953	(5)	[6] 7,049	[6] 85,060	3,834	6,256	6	[6] 126,586
Trinidad and Tobago	329	1,757	-------	1,524	5,606	44	3,367	-------	12,627
Other North America	-------	5	-------	4	2,178	-------	-------	-------	2,187
Total	[6] 33,377	[6] 25,463	17	[6] 8,731	[6] 104,276	3,912	9,656	12	[6] 185,444
South America:									
Brazil	402	-------	-------	-------	1,398	-------	-------	-------	1,800
Colombia	9,770	-------	-------	-------	187	-------	-------	-------	9,957
Venezuela	191,559	2,420	17	4,952	84,898	3,573	7,646	-------	295,065
Other South America	96	-------	-------	-------	-------	(5)	-------	-------	96
Total	201,827	2,420	17	4,952	86,483	3,573	7,646	-------	306,918
Europe:									
Italy	-------	-------	-------	41	1,725	-------	935	-------	2,701
United Kingdom	-------	-------	(5)	(5)	88	-------	-------	1	89
Other Europe	-------	11	-------	-------	-------	16	-------	1	28
Total	-------	11	(5)	41	1,813	16	935	2	2,818
Asia:									
Bahrein	-------	-------	-------	311	1,206	-------	-------	-------	1,517
Indonesia	23,845	-------	-------	-------	-------	-------	-------	-------	23,845
Iran	5,829	-------	-------	-------	-------	-------	-------	-------	5,829
Iraq	8,411	-------	-------	-------	-------	-------	-------	-------	8,411
Japan	-------	1,198	-------	-------	-------	-------	434	(5)	1,632
Kuwait	81,037	265	-------	133	2,026	-------	1,839	-------	85,300
Qatar [7]	1,538	-------	-------	-------	-------	-------	-------	-------	1,538
Saudi Arabia	27,159	372	-------	545	119	-------	-------	-------	28,195
Other Asia	684	-------	-------	2	2	-------	-------	-------	688
Total	148,503	1,835	-------	991	3,353	-------	2,273	(5)	156,955
Grand total	[6] 383,707	[6] 29,729	34	[6] 14,715	[6] 195,925	7,501	20,510	14	[6] 652,135
Shipments from noncontiguous Territories and possessions to the United States: Puerto Rico [8]	-------	5,392	-------	1,073	3,571	-------	-------	-------	10,036
Imports into U.S. Territories and possessions from foreign countries:									
Alaska	-------	19	-------	-------	-------	-------	-------	-------	19
Hawaii	-------	371	-------	856	1,325	-------	-------	-------	2,552
Puerto Rico	22,957	148	-------	38	1,187	25	1,631	6	25,992
Total	22,957	538	-------	894	2,512	25	1,631	6	28,563
Total net imports into the 48 United States	[6] 360,750	[6] 34,583	34	[6] 14,894	[6] 196,984	7,476	18,879	8	[6] 633,608

See footnotes at end of table.

Digitized by Google

TABLE 86.—Crude petroleum and petroleum products imported for consumption into the United States, 1958–59, by country, in thousand barrels [1]—Continued

[Bureau of the Census]

Country	Crude petroleum	Gasoline [2]	Kerosine	Distillate oils [3]	Residual oil [3]	Asphalt	Unfinished oil	Miscellaneous oils [4]	Total
1959									
North America:									
Canada	33,902	1,189	-------	241	521	(5)	152	(5)	36,005
Mexico	229	-------	-------	239	12,455	-------	-------	19	12,942
Netherlands Antilles	877	14,755	12	6,994	93,063	4,190	3,367	4	123,262
Trinidad and Tobago	92	1,133	-------	425	7,180	128	3,317	-------	12,275
Other North America	---------	65	-------	78	1,876	-------	-------	-------	2,019
Total	35,100	17,142	12	7,977	115,095	4,318	6,836	23	186,503
South America:									
Brazil	1,012	-------	-------	-------	99	-------	-------	-------	1,111
Colombia	11,525	-------	-------	1	502	-------	-------	-------	12,028
Venezuela	195,240	3,307	113	6,746	100,763	2,663	9,618	(5)	318,450
Other South America	---------	-------	-------	-------	---------	1	-------	(5)	1
Total	207,777	3,307	113	6,747	101,364	2,664	9,618	(5)	331,590
Europe:									
Italy	---------	139	-------	24	877	-------	403	(5)	1,443
United Kingdom	---------	(5)	(5)	-------	407	-------	-------	(5)	407
Other Europe	---------	(5)	-------	15	154	(5)	-------	(5)	169
Total	---------	139	(5)	39	1,438	(5)	403	(5)	2,019
Asia:									
Bahrein	---------	132	-------	38	265	-------	-------	-------	435
Indonesia	24,235	-------	-------	-------	-------	-------	-------	-------	24,235
Iran	9,699	-------	-------	-------	-------	-------	-------	-------	9,699
Iraq	8,541	-------	-------	-------	-------	-------	-------	-------	8,541
Japan	---------	262	-------	-------	---------	-------	998	2	1,262
Kuwait	72,201	150	-------	-------	5,706	-------	5,280	-------	83,337
Qatar [7]	544	-------	-------	-------	-------	-------	-------	-------	544
Saudi Arabia	23,660	36	-------	-------	93	-------	-------	-------	23,789
Other Asia	189	-------	-------	-------	-------	-------	-------	-------	189
Total	139,069	580	-------	38	6,064	-------	6,278	2	152,031
Africa: Canary Islands	---------	-------	-------	-------	8	-------	-------	-------	8
Oceania	---------	-------	-------	-------	41	-------	-------	-------	41
Grand total	381,946	21,168	125	14,801	224,010	6,982	23,135	25	672,192
Shipments from noncontiguous Territories and possessions to the United States: Puerto Rico [8]	---------	6,531	1	2,910	4,567	-------	-------	-------	14,009
Imports into U.S. Territories and possessions from foreign countries:									
Hawaii	---------	-------	-------	-------	41	-------	-------	-------	41
Puerto Rico	24,082	718	12	13	1,286	113	3,235	-------	29,459
Total	24,082	718	12	13	1,327	113	3,235	-------	29,500
Total net imports into the United States	357,864	26,981	114	17,698	227,250	6,869	19,900	25	656,701

[1] Compiled by Mae B. Price and Elsie D. Jackson, of the Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.
[2] Includes jet fuel and naphtha, but excludes benzol (1958: 1,061,000 barrels; 1959: 1,365,000).
[3] Includes quantities imported free for manufacture in bond and export and for vessels and aircraft.
[4] Includes quantities imported free for supplies of vessels and aircraft.
[5] Less than 1,000 barrels.
[6] Revised figure.
[7] Assumed source; classified in import statistics under "Arabia Peninsular States, n.e.c."
[8] As reported to Bureau of Mines by shipping companies.

Digitized by Google

TABLE 87.—Petroleum oils, crude and refined, shipped from the United States, including shipments to Territories and possessions, 1958–59, by classes and months [1]

(Thousand barrels)

Year and class	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1958													
Crude petroleum	425	213	838	643	503	216	308	334	170	330	292	74	4,346
Refined products:													
Gasoline [2]	2,198	2,035	1,892	2,432	2,210	1,918	2,612	2,517	2,470	2,410	2,597	2,112	27,403
Kerosine	74	89	62	53	59	67	45	48	60	235	280	145	1,217
Distillate fuel oil	1,555	1,835	1,889	1,165	1,557	1,309	2,078	1,906	1,563	1,073	2,027	985	18,942
Residual fuel oil	1,695	1,573	1,989	1,564	2,557	2,356	2,657	2,271	2,782	2,488	1,997	1,814	25,743
Jet fuel	17			1	5	5		25	56	73	24	5	211
Lubricants	850	1,013	936	1,186	1,174	970	1,184	1,398	978	1,267	1,169	978	13,003
Paraffin wax	62	59	73	65	78	66	82	72	84	85	86	99	911
Coke	397	426	338	488	317	331	457	403	246	416	333	343	4,405
Asphalt	157	82	76	102	78	137	176	169	99	155	83	50	1,364
Liquefied gases	279	265	403	223	165	209	201	206	228	210	208	230	2,827
Miscellaneous oils	21	19	23	22	19	17	21	26	25	27	23	23	266
Total refined	7,215	7,396	7,681	7,301	8,219	7,285	9,513	9,041	8,591	8,439	8,827	6,784	96,292
Total crude and refined	7,640	7,609	8,519	7,944	8,722	7,501	9,821	9,375	8,761	8,769	9,119	6,858	100,638
1959 [3]													
Crude petroleum	352	97	178	230	267	192	174	237	151	258	132	258	2,526
Refined products:													
Gasoline [2]	1,575	1,682	1,262	2,243	2,002	1,814	2,056	1,398	1,781	1,688	1,537	1,793	20,831
Kerosine	74	28	41	33	24	70	41	77	155	47	51	389	1,030
Distillate fuel oil	1,261	856	1,427	951	1,122	1,182	886	1,673	979	883	849	1,195	13,264
Residual fuel oil	3,234	2,345	2,703	2,572	1,950	2,499	2,145	1,554	1,887	2,403	1,339	1,409	26,040
Jet fuel		35	14	1	27	5	2	72	14	78	62	80	390
Lubricants	1,051	961	1,174	1,411	1,181	1,231	1,281	1,154	1,026	1,278	908	1,477	14,133
Paraffin wax	72	82	96	85	92	95	82	75	93	76	85	100	1,033
Coke	431	197	304	334	383	433	436	407	447	496	354	458	4,680
Asphalt	70	64	70	117	93	57	131	74	84	118	64	90	1,032
Liquefied gases	205	171	188	192	166	196	179	189	160	201	187	218	2,252
Miscellaneous oils	25	18	18	24	27	18	25	25	27	19	17	29	272
Total refined	7,908	6,439	7,297	7,963	7,067	7,600	7,264	6,698	6,653	7,287	5,453	7,238	84,957
Total crude and refined	8,350	6,536	7,475	8,193	7,334	7,792	7,438	6,935	6,804	7,545	5,585	7,496	87,483

[1] Compiled from records of U.S. Department of Commerce, except Alaska (before 1959) and Hawaii, which are Bureau of Mines data; figures may differ slightly from those used in other sections of this chapter.

[2] Includes benzol, naphtha, natural gasoline, and antiknock compounds.

[3] Preliminary figures.

Digitized by Google

TABLE 88.—Crude petroleum and petroleum products exported from the United States, 1958–59, by country of destination, and shipments to and exports from Territories and possessions, in thousand barrels [1]

[Bureau of the Census]

Country	Crude petroleum	Gasoline [2 3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [3]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [3]	Total
1958													
North America:													
Canada	1,153	1,562	587	3,665	4,385	970	103	369	145	1,653	13	45	14,650
Cuba	592	381	(4)	179	239	202	3	96	30	----------	2	14	1,738
El Salvador	----------	186	28	42	110	23	(4)	6	6	----------	1	2	404
Mexico	696	3,990	258	1,868	2,763	126	292	2,119	102	8	6	36	12,264
Netherlands Antilles	----------	1,330	----------	639	2,014	14	(4)	----------	1	----------	(4)	(4)	3,998
Other North America	----------	314	88	230	1,341	247	75	51	62	----------	7	14	2,429
Total	2,441	7,763	961	6,623	10,852	1,582	473	2,641	346	1,661	29	111	35,483
South America:													
Argentina	----------	(4)	----------	----------	----------	11	(4)	----------	(4)	----------	(4)	(4)	11
Brazil	----------	[5] 14	2	64	----------	1,010	92	209	25	25	8	1	[5] 1,450
Chile	----------	6	(4)	20	749	151	52	----------	30	----------	1	7	1,016
Colombia	----------	2	(4)	(4)	----------	169	(4)	(4)	108	----------	3	8	290
Peru	----------	22	----------	----------	(4)	120	2	----------	24	----------	1	6	175
Venezuela	----------	2	----------	----------	----------	430	3	(4)	27	----------	2	23	487
Other South America	----------	1	(4)	3	39	102	48	(4)	29	(4)	2	8	232
Total	----------	[5] 47	2	87	788	1,993	197	209	243	25	17	53	[5] 3,661
Europe:													
Belgium Luxembourg	----------	25	1	109	64	676	2	----------	9	599	5	6	1,496
France	450	15	(4)	(4)	120	46	1	(4)	29	266	4	2	933
Germany, West	----------	78	6	203	892	281	(4)	(4)	15	15	10	1	1,501
Italy	----------	90	(4)	----------	----------	205	2	----------	28	228	7	6	566
Netherlands	----------	50	1	1,212	1,075	275	(4)	----------	25	----------	4	5	2,647
Sweden	----------	16	1	496	237	312	(4)	----------	8	37	2	6	1,115
United Kingdom	378	93	80	3,319	1,424	942	(4)	(4)	49	67	35	1	6,388
Other Europe	(4)	12	17	245	126	742	7	----------	26	407	16	14	1,612
Total	828	379	106	5,584	3,938	3,479	12	(4)	189	1,619	83	41	16,258

See footnotes at end of table.

Digitized by Google

TABLE 88.—Crude petroleum and petroleum products exported from the United States, 1958–59, by country of destination, and shipments to and exports from Territories and possessions, in thousand barrels [1]—Continued

[Bureau of the Census]

Country	Crude petroleum	Gasoline [2 3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [2]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [2]	Total
Asia:													
India		21	2			476	5	(4)	1	47	13	8	573
Japan Nansei and Nanpo Islands	1,076	49	3	4,458	[5] 6,481	550	5	(4)	19	897	17	7	13,562
Malaya and Singapore		(4)				68	1	(4)	1		3	2	75
Philippines		3	(4)			280	119		12		12	10	436
Turkey		278		105	(4)	429	(4)		1		(4)	17	830
Other Asia		25	(4)	76	84	1,040	42		46	28	42	40	1,423
Total	1,076	376	5	4,639	[5] 6,565	2,843	172	(4)	80	972	87	84	[5] 16,899
Africa:													
Belgian Congo		5	2			64	58		(4)		(4)	3	132
French West Africa and Republic of Togo		8	3	12	317	4	1				(4)	2	347
Union of South Africa		30	(4)		(4)	422	111		34		21	22	640
United Arab Republic (Egypt Region)		2				391			1		1	11	406
Other Africa		5	43	100	297	233	49	(4)	2	95	4	15	843
Total		50	48	112	614	1,114	219	(4)	37	95	26	53	2,368
Oceania:													
Australia		5	1	6		763	(4)	(4)	8	34	12	1	830
French Pacific Islands		37	15	60	25	4	(4)	1				(4)	142
New Zealand		8	1			150	10	3	2		2		176
Other Oceania		1	1	4		(4)		(4)			(4)		6
Total		51	18	70	25	917	10	4	10	34	14	1	1,154
Grand total	4,345	[5] 20,374	1,140	17,115	[5] 22,782	12,464	1,083	2,854	905	4,406	256	518	[5] 88,242
Shipments from the 48 United States to Territories and possessions:													
Alaska and Hawaii [6]		6,680	131	2,698	5,837	116	137	2	(7)	(7)	(7)	57	15,658
Puerto Rico	(7)	[5] 551	18	6	(7)	78	[5] 130	(7)	(7)	(7)	(7)	5	[5] 788
Wake	(7)	942	(4)	12	(7)	1	(4)	(7)	(7)	(7)	(7)	(4)	955
Other	(7)	102	11	34	(7)	6	17	(7)	(7)	(7)	(7)	(4)	170
Total		[5] 8,275	160	2,750	5,837	201	[5] 284	2	(7)	(7)	(7)	62	[5] 17,571

Digitized by Google

Exports from noncontiguous Territories and possessions to foreign countries:													
Alaska		77	(4)	243		2		8				(4)	330
Other		128	80	631	2,858	(4)	(4)	20	(4)				3,717
Total		205	80	874	2,858	2	(4)	28	(4)			(4)	4,047
Total net shipments from the 48 United States	4,345	[5] 28,444	1,220	18,991	[5] 25,761	12,663	[5] 1,367	2,828	905	4,406	256	580	[5] 101,766
1959													
North America:													
Canada	(4)	1,523	661	3,347	4,946	1,172	116	90	166	1,626	14	52	13,713
Cuba		20		40	83	234	3	89	30	(4)	2	14	515
El Salvador		12			129	20			8		1	2	172
Mexico	21	2,726	127	512	1,810	115	269	2,023	142	(4)	10	42	7,797
Netherlands Antilles		53		267	1,177	17			1		(4)	(4)	1,515
Other North America		65	17	143	778	302	49	32	56		9	16	1,467
Total	21	4,399	805	4,309	8,923	1,860	437	2,234	403	1,626	36	126	25,179
South America:													
Argentina		5		1		23	1	2	1			(4)	33
Brazil		5		100		1,143	2		51	27	10	1	1,339
Chile		1	1	20	863	165	56		25		1	11	1,143
Colombia		80			19	177	(4)	1	104		3	8	392
Peru		62			99	93	(4)		22		1	9	286
Venezuela		175				246	5	2	20		2	26	476
Other South America		1		(4)		102	3		34	(4)	2	7	149
Total		329	1	121	981	1,949	67	5	257	27	19	62	3,818
Europe:													
Belgium-Luxembourg		20	1	9	152	714	1	(4)	9	247	4	7	1,164
France	550	(4)		(4)		35	1		35	236	4	2	863
Germany, West		162	6		624	358	(4)	3	19	1	10	2	1,185
Italy		121		1		261	2	(4)	17	341	6	10	759
Netherlands		110	1			353	(4)	(4)	28	60	10	9	571
Sweden		(4)	1	28	627	292	(4)		8	34	2	8	1,000
United Kingdom	405	25	90	2,723	1,251	1,075	(4)	(4)	59	49	31	1	5,709
Other Europe		15	(4)	89	81	709	5	(4)	33	568	9	15	1,524
Total	955	453	99	2,850	2,735	3,797	9	3	208	1,536	76	54	12,775

See footnotes at end of table.

Digitized by Google

TABLE 88.—Crude petroleum and petroleum products exported from the United States, 1958–59, by country of destination, and shipments to and exports from Territories and possessions, in thousand barrels[1]—Continued

[Bureau of the Census]

Country	Crude petroleum	Gasoline [2 3]	Kerosine	Distillate oil	Residual oil	Lubricating oil [2]	Asphalt	Liquefied petroleum gases	Wax	Coke	Petrolatum	Miscellaneous products [2]	Total
Asia:													
India		43	(4)			697	6		1	52	13	5	817
Japan-Nansei and Nanpo Islands	1,548	105	1	5,241	8,250	1,078	5	4	22	1,288	29	13	17,584
Malaya and Singapore		(4)		(4)		60	(4)				2	2	64
Philippines		10	(4)			407	84		12		15	15	543
Turkey		50				286			2		1	18	357
Other Asia		26	1		71	1,090	18	1	75	27	32	44	1,385
Total	1,548	234	2	5,241	8,321	3,618	113	5	112	1,367	92	97	20,750
Africa:													
Belgian Congo		33	2		15	79	27				(4)	4	160
French West Africa and Republic of Togo		4	3	5	98	3	4				(4)	1	118
Union of South Africa		22	1			440	85		34		22	17	621
United Arab Republic (Egypt Region)		3	(4)			230			(4)		(4)	7	240
Other Africa		6	8	73	138	208	63		2	75	4	19	596
Total		68	14	78	251	960	179		36	75	26	48	1,735
Oceania:													
Australia		16	2	12	102	789	(4)		11	49	8	1	990
French Pacific Islands		31	9	66	6	5	1	1				(4)	119
New Zealand		3	1			119	1	2	4		3		133
Other Oceania		1	1	4		(4)	6	1				(4)	13
Total		51	13	82	108	913	8	4	15	49	11	1	1,255
Grand total	2,524	15,518	934	12,681	21,319	13,536	813	2,251	1,031	4,680	260	563	76,110
Shipments from the United States to Territories and possessions:													
Hawaii [5]		4,144	86	624	5,225	104	99		3		(7)	227	10,512
Puerto Rico	(7)	401	100		(7)	87	99	(7)	(7)	(7)	(7)	6	693
Wake	(7)	855	(4)	12	(7)	(4)	2	(7)	(7)	(7)	(7)	(4)	869
Other	(7)	94	14	104	(7)	3	20	(7)	(7)	(7)	(7)	(4)	235
Total		5,494	200	740	5,225	194	220		3		(7)	233	12,309

Digitized by Google

Exports from noncontiguous Territories and possessions to foreign countries:													
Hawaii	----------	(4)	----------	3	----------	----------	----------	----------	----------	----------	----------	----------	3
Puerto Rico	----------	113	2	77	503	(4)	(4)	----------	----------	----------	----------	----------	695
Total	----------	113	2	80	503	(4)	(4)	----------	----------	----------	----------	----------	698
Total net shipments from the United States	2,524	20,899	1,132	13,341	26,041	13,730	1,033	2,251	1,034	4,680	260	796	87,721

[1] Compiled by Mae B. Price and Elsie D Jackson, of the Bureau of Mines, from records of the Bureau of the Census, U.S. Department of Commerce.

[2] Country and continent totals exclude but grand totals include: 1958, 11,708,000 barrels of aviation gasoline; 1959, 9,984,000 barrels of aviation gasoline; 1958, 536,000 barrels of lubricating oils: 1959. 439,000 barrels of lubricating oils; and 1958, 175,000 barrels of jet fuel; 1959, 175,000 barrels of jet fuel for which country breakdown may not be published for security reasons.

[3] Includes naphtha but excludes benzol: 1958, 273,000 barrels; 1959, 174,000 barrels.

[4] Less than 1,000 barrels.

[5] Revised figure.

[6] Figures represent shipments from refining companies through Pacific coast ports to Alaska and Hawaii for 1958 and to Hawaii only for 1959, as reported to Bureau of Mines by shippers.

[7] Not separately classified.

Digitized by Google

WORLD SUPPLY AND DEMAND

PETROLEUM [5]

World production of crude petroleum reached 7,127 million barrels in 1959—an increase of 7.9 percent over 1958 and an appreciable gain over the 2.6-percent increase noted in 1958. North America, producing 40.6 percent of the world total, continued to be the chief source of supply, although its percentage of the world output declined slightly below 1958. The next largest supplier, the Middle East, contributed 23.6 percent, the same proportion as in 1958. South American production amounted to 16.3 percent of the world total, a slight decline from 1958, despite appreciable gains in several South American countries. The total contribution of these three areas was 80.5 percent of world production—a slight decline from 1958. Gains in Africa, a region whose output was still negligible compared with that of the principal areas, were notable from a long-range aspect.

In North America, where crude production totaled 2,897 million barrels, the United States recovered from a sharp drop in 1958 and contributed 88.8 percent of the total. Canadian production also rose abruptly from the 1958 decline to reach a record 185 million barrels, an increase of 12.1 percent. An appreciable increase in output was recorded in Mexico, but production in Cuba continued its discouraging decline.

South America produced 1,163 million barrels in 1959, an increase of 7.3 percent. This increase was primarily due to a gain of 6.3 percent in Venezuelan output, which was 1,011 million barrels. Colombia, the second largest producing country in South America, increased output by 14 percent to 54 million barrels, owing principally to a marked increase in the Cicuco field. Elsewhere in South America, Argentina produced a record 45 million barrels, a gain of 24.8 percent, owing primarily to intensified activity of Yacimientos Petroliferos Fiscales, the government oil agency, in established fields. Brazil showed a comparable gain, 24.3 percent, to reach 24 million barrels.

Europe (exclusive of U.S.S.R. and the satellite countries) produced 94 million barrels, a negligible proportion of the world total. Output in Western Germany, the largest producer, rose 15 percent to 37 million barrels. Although some new fields were discovered, the gain was due to larger output from the older fields. Production in Austria (17 million barrels), declined 13.4 percent, an even greater drop than that recorded in 1958. Percentage gains in France, Italy, and the Netherlands amounted to 17, 10.4 and 9.4, respectively.

Total crude production of the Middle East (comprising Bahrain, Iran, Iraq, Israel, Kuwait, Neutral Zone, Qatar, Saudi Arabia, and Turkey) was 1,685 million barrels, an increase of 8.1 percent. This gain developed despite a decline of 1 percent in production in Kuwait, the foremost Middle Eastern producer. Output in Saudi Arabia, the second ranking country, continued the steady gains of the preceding few years. Production in 1959, 400 million barrels, exceeded that in 1958 by 7.9 percent. Neutral Zone production increased sharply by 43.7 percent to reach 42 million barrels, as crude from that region had

[5] J. V. Hightower, commodity-industry analyst.

Digitized by Google

a ready market because of its high fuel oil content and relatively low price.

Production in Africa increased 32.1 percent in 1959 to 42 million barrels, despite a small decline in Egypt, the region's leading producer. Although this quantity was a negligible part of world output, the relative gain greatly exceeded increases in other regions and reflected the significant future role of Algeria in world output.

Algeria tripled its production in 1959 to reach 10 million barrels. At the beginning of the year, daily output averaged 14,500 barrels, but in December it had increased to 93,000 barrels. Production during most of the year had been restricted by limited transportation facilities. By the end of the year, however, a 24-inch pipeline running from the Hassi Messaoud field, the producing center in the Sahara region of Algeria, to the Mediterranean port of Bougie was completed. Construction was begun late in the year on another pipeline to carry crude from the Edjele field through Tunisia to the Mediterranean. Drilling increased 35 percent to about a million feet during the year.

Nigeria doubled production to 4 million barrels in 1959. Output could have been appreciably higher except for lack of storage facilities and the fact that tanker capacity was limited by shallow water at the mouth of the Bonny River leading to the South Atlantic. Dredging work was begun. Production in Gabon increased 49.2 percent to 5 million barrels, substantially all of which went to France.

Another significant aspect of developments in Africa centered on operations in Libya. Although crude production did not reach commercial proportions, exploratory wells drilled in 1959 apparently established Libya as an important source of future supplies of crude petroleum. Test production from wells drilled by several companies showed rates as high as 17,500 barrels daily. One major oil company was reported to be planning a 30-inch pipeline to run 100 miles from its most promising producing area to the Mediterranean.

No important developments occurred in the South Asia-Far East-Oceania area, comprising British Borneo, Burma, India, Indonesia, Japan, New Guinea, Pakistan, and Taiwan. Production of crude in 1959 totaled 193 million barrels, a gain of 12.9 percent. Indonesia, which increased its output by 16.8 percent, supplied 72 percent of the total. There was virtually no change in the output of British Borneo, the second largest source in the area. Small gains were recorded in Burma, India, Japan, and Pakistan. Production in New Guinea continued the steady decline of recent years.

Outside the free world, crude production in 1959 totaled 1,046 million barrels, an increase of 13.2 percent. This figure is the sum of crude output of the U.S.S.R. (which produced 90.3 percent of the total), Albania, Bulgaria, Czechoslovakia, Hungary, Poland, and Rumania. The output represented 14.7 percent of world production, only slightly higher than in 1958. Production in the U.S.S.R. increased 14.4 percent to 945 million barrels in 1959. Outside Russia, Rumania was by far the leading producer in the Soviet bloc, with 85 million barrels, a small gain over 1958. Ranking next to Rumania, Hungary increased production by 26.6 percent to reach 8 million barrels.

Digitized by Google

In table 90,* free world imports of crude petroleum in 1959 totaled 2,351 million barrels and world exports and reexports 2,309 million barrels. The gap of 42 million barrels between imports and exports and reexports is about equal to the movement of crude petroleum to the free world from the Soviet bloc during the year. Imports in 1959 increased about 8 percent.

Free world output of refined products, including refinery fuel and loss, totaled 6,303 million barrels. This quantity was approximately 5 percent above that in 1958. In the United States, output of refined products increased 4 percent; in South America, 1 percent; in Western Europe, 5 percent; in the Middle East, 14 percent; and in South Asia, the Far East, and Oceania, 7 percent. Distillate fuel oil, which rose 7 percent, and residual fuel oil, which rose 3 percent, accounted for most of the increase in product output.

Free world movements of refined products were 1,133 million barrels of imports and 1,247 million barrels of exports and reexports. The import total for 1959 is believed to be understated by approximately 191 million barrels. This quantity is the difference between imports and exports and reexports, or 114 million barrels, plus an estimated 77 million barrels of refined products shipped from the Soviet bloc to reporting countries and not shown as exports. Actual free world imports of products in 1959 may therefore have been about 1,324 million barrels. The gap between actual and reported imports is due largely to the failure of many countries to report as imports entries into bonded stocks and the use of such stocks for international bunkers, also to lack of reports on military deliveries.

Free world domestic demand for refined products was 6,223 million barrels in 1959, or about 7 percent greater than demand in 1958. Domestic demand in the United States increased 4 percent; in Western Europe, 10 percent; and in South Asia, the Far East, and Oceania, 23 percent. In South America, demand decreased 3 percent from 1958. Among the individual products, demand for residual fuel oil increased 7 percent; distillate fuel oil, 2 percent; gasoline, 4 percent; and lubricants, 3 percent.

The new supply of refined products in the free world in 1959 is estimated at 6,215 million barrels. This estimate is based on an output of 6,303 million barrels for the year, minus an estimated refinery-fuel use and loss of 167 million barrels in the United States and 154 million barrels in other countries, plus 77 million barrels of refined products delivered to the free world from the Soviet bloc, plus 146 million barrels of liquefied petroleum gas (LPG) from natural-gasoline plants in the United States which is used directly for chemicals and fuels and not included in refinery output, plus an estimated 10 million barrels of similar LPG in other countries.

---

*Free world supply and demand totals including imports, shown in table 90, are preliminary because of the estimated data used for a number of countries. An adjusted summary of supply and demand for 1959 will be included in the 1960 Minerals Yearbook.

Digitized by Google

TABLE 89.—World production of crude petroleum, by countries, 1955–59, in thousand barrels [1]

[Compiled by Pearl J. Thompson and Berenice B. Mitchell]

Country	1955	1956	1957	1958	1959 [2]
North America (including Caribbean):					
Canada	129,440	171,981	181,848	165,496	184,768
Cuba [3]	375	543	395	344	209
Mexico	89,406	90,660	88,266	93,533	96,393
Trinidad	24,896	28,929	34,064	37,355	40,919
United States (including Alaska)	2,484,428	2,617,283	2,616,901	2,449,016	2,574,590
Total	2,728,545	2,909,396	2,921,474	2,745,744	2,896,879
South America:					
Argentina	30,501	31,013	30,557	35,829	44,710
Bolivia	2,693	3,196	3,575	3,435	3,170
Brazil	2,022	4,059	10,106	18,919	23,590
Chile	2,577	3,542	4,337	5,568	6,428
Colombia	39,711	44,968	46,782	46,901	53,574
Ecuador	3,599	3,420	3,191	3,108	2,759
Peru	17,242	18,383	19,222	18,732	17,733
Venezuela	787,409	809,212	1,014,457	950,796	1,011,452
Total	885,754	1,007,793	1,132,227	1,083,288	1,163,416
Europe:					
Albania	1,388	1,868	3,268	2,690	3,670
Austria	24,886	23,622	21,955	19,548	16,946
Bulgaria	1,103	1,691	2,095	1,632	1,460
Czechoslovakia	726	732	732	950	746
France	6,224	9,100	10,157	9,983	11,687
Germany, West	22,435	25,408	28,698	32,119	36,981
Hungary	12,216	9,172	5,127	6,325	8,012
Italy	1,519	4,209	8,593	10,461	11,551
Netherlands	7,126	7,652	10,623	11,306	12,367
Poland	1,334	1,363	1,340	1,298	1,298
Rumania	78,670	81,390	83,327	84,490	85,247
U.S.S.R. [4]	509,760	611,740	717,926	826,397	945,350
United Kingdom	408	489	606	591	621
Yugoslavia	2,027	2,076	2,797	3,267	4,188
Total [4]	669,822	780,512	807,244	1,011,057	1,140,124
Asia:					
Bahrein	10,982	11,015	11,691	14,823	16,473
Burma	1,582	1,726	2,981	3,474	3,967
China [3]	3,500	4,700	5,000	6,000	7,000
India	2,526	2,876	3,241	3,258	3,377
Indonesia	87,083	93,820	114,151	118,715	139,038
Iran	120,562	197,148	263,134	301,361	344,800
Iraq	251,206	232,307	163,498	266,125	311,193
Israel		146	394	642	925
Japan	2,229	2,169	2,243	2,563	2,852
Kuwait	398,493	399,874	416,045	509,654	504,855
Kuwait-Neutral Zone	8,848	11,684	23,259	29,469	42,438
Pakistan	2,068	2,118	2,200	2,272	2,333
Qatar	41,983	45,300	50,798	63,412	61,431
Sarawak and Brunei	39,751	42,983	41,821	39,551	40,072
Saudi Arabia	352,240	360,923	362,121	370,486	399,821
Taiwan (Formosa)	24	21	17	15	13
Turkey	1,205	2,213	2,159	2,379	2,700
Total [4]	1,324,282	1,411,023	1,464,753	1,734,199	1,883,288
Africa:					
Algeria	438	253	101	[5] 3,315	[5] 10,205
Angola		52	71	358	361
Gabon, Republic of			1,207	3,550	5,295
Morocco: Southern Zone	765	734	566	560	712
Nigeria				1,970	4,067
United Arab Republic (Egypt Region)	12,634	12,185	16,157	21,960	21,303
Total	13,837	13,224	18,102	31,713	41,943
Oceania:					
New Guinea	3,413	2,610	2,279	1,850	1,656
New Zealand	6	7	6	5	[5] 4
Total	3,419	2,617	2,285	1,855	1,660
World total	5,625,659	6,124,565	6,436,085	6,607,856	7,127,310

[1] This table incorporates some revisions. [2] Preliminary figures. [3] Natural naphtha and gas oil.
[4] U.S.S.R. in Asia (including Sakhalin) included with U.S.S.R. in Europe.
[5] Estimate. [6] Including Sahara.

Digitized by Google

TABLE 90.—World[1] supply and demand crude petroleum and refined products, 1959[2]

(Thousands of barrels)

Country	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total[3] refinery input / Total[4] refinery output	Imports	Exports and reexports	Domestic demand (including bunkers)[5]	Bunkers—all flags (as reported)
North America:									
Canada	184,768	115,289	33,362	+226	269,824	38,880	1,457	[6] 295,633	
Mexico	96,393	73	112	−1,016	104,932	4,665	13,348	96,249	
United States (including Alaska)	2,574,590	352,344	2,526	+6,747	3,070,984	297,285	84,957	[6] 3,439,078	80,662
Total	2,855,751	467,706	36,000	+5,957	3,445,740	340,830	99,762	3,830,960	
Central America and Caribbean:									
Canal Zone						7,209	1,972	5,237	
Costa Rica						[7] 1,146		1,146	
Cuba	209	25,402		−453	26,064	[7] 4,398		30,462	
Dominican Republic						[7] 2,036		2,036	
El Salvador						[7] 1,314		1,314	
Guatemala						3,303		3,303	
Haiti						[7] 593		593	
Jamaica						5,349		5,349	
Nicaragua						[7] 1,094		1,094	
Panama, Republic of						[7] 2,797	6	2,791	
Puerto Rico		25,662		−520	27,331	4,578	14,631	17,278	
Total	209	51,064		−973	53,395	33,817	16,609	70,603	
South America:									
Argentina	44,710	37,957		+3,657	79,033	18,849	9	[6] 86,510	
Bolivia	3,170		948	+11	2,211	113	8	[6] 2,058	
Brazil	23,590	42,223	11,123	−1,458	56,148	[7] 24,160		[6] 86,130	
British Guiana						1,278	1	1,277	7
Chile	6,428	2,769		+619	8,677	[7] 7,140		[6] 15,707	
Colombia	53,574		28,522	+844	24,931		4,130	[6] 18,236	1,387
Ecuador	2,759	250	283	−108	2,834	935		3,769	
Netherlands Antilles		255,138		−2,465	272,010	[7] 25,478	245,749	[6] 51,739	
Paraguay						723		[6] 640	
Peru	17,733		2,110	+112	15,664	2,556	2,797	15,423	340
Trinidad	40,919	31,012	3,254	+49	69,115	2,455	54,874	[6] 16,632	13,436
Uruguay		8,300		−54	8,354	2,722	952	10,124	911
Venezuela	1,011,452		719,835	−5,281	298,991	[7] 570	218,423	[6] 48,602	17,821
Total	1,204,335	377,649	766,075	−4,074	837,968	86,979	526,943	356,847	

Digitized by Google

Western Europe:									
Austria	16,946	3,299	6,974	+138	13,681	6,806	1,334	[6] 17,974	
Belgium and Luxembourg		49,887		+421	49,381	19,775	18,685	[6] 47,791	
Denmark		269		+47	222	34,089	110	34,201	1,881
Finland		7,972			[7] 7,972	5,793		13,765	
France	11,687	221,647		+7,528	226,041	14,300	48,386	[6] 181,110	11,541
Germany, West	36,981	122,693		−1,008	160,682	38,453	21,026	[6] 195,109	12,830
Greece		10,079		+77	10,002	2,947		12,949	
Iceland						2,924		2,924	
Ireland		5,772		+606	5,166	6,090	728	[6] 8,790	
Italy	11,551	181,058	3,244	−1,777	191,929	5,651	49,295	[6] 121,635	11,902
Netherlands	12,367	85,764		−4,910	115,044	36,000	66,895	84,149	7,290
Norway		735		+42	693	23,435		[6] 23,414	[7] 2,097
Portugal		9,343		−635	9,978	2,515	2,134	10,359	
Spain		30,217		+689	30,265	1,409		31,674	
Sweden		17,255		−440	17,695	62,069	794	[6] 75,798	[7] 2,956
Switzerland						22,699	1	22,698	
United Kingdom	621	285,118		+1,856	283,883	102,498	52,492	[6] 327,003	29,918
Yugoslavia	4,188	[7] 4,489		+6	8,671	[7] 838	[7] 546	8,963	
Total	94,341	1,035,097	10,218	+2,640	1,131,305	388,291	262,426	1,220,306	
Middle East:									
Aden		30,781		+68	30,713	10,639	15,630	[6] 25,722	22,635
Bahrain	16,473	52,659		+174	69,144	449	60,351	9,242	4,511
Iran	344,800		212,657	−3,371	135,514		76,529	[6] 49,324	[7] 15,000
Iraq	311,193		[7] 290,371	+8,184	[7] 12,638	[6] 50		12,688	
Israel	925	[7] 8,555			9,480	[7] 11,090		20,570	[7] 372
Jordan						[7] 1,143		1,143	
Kuwait	504,855		452,064	+775	52,016	197	27,708	[6] 24,505	18,551
Lebanon		5,493			5,493	[7] 319		5,812	
Neutral Zone	42,438		[7] 32,500	−992	[7] 10,930		[7] 7,350	3,580	[7] 2,200
Qatar	61,431		61,237		[7] 194			194	
Saudi Arabia	399,821		334,848	+1,363	63,610	122	43,608	[6] 14,970	[7] 11,793
Turkey	2,700			+162	2,538	11,845		14,383	
United Arab Republic (Syria Region)		[7] 1,830			[7] 1,830	3,566		5,396	
Total	1,684,636	99,318	1,383,677	+6,363	394,100	39,420	231,266	187,529	
Africa:									
Algeria	10,205		6,563	+3,642		8,879		[6] 7,079	
Angola	361	129		+7	483	939		[6] 1,377	
Belgian Congo						3,579		3,579	
Canary Islands		20,920		+93	23,580	1,195	15,330	9,445	5,411
Ethiopia						[7] 696		696	
French Equatorial Africa, States formerly in	5,295		5,170	+125		[7] 2,182		2,182	
French West Africa						[7] 4,091		4,091	11,800
Ghana						2,834		2,834	
Kenya						[7] 5,904	1,036	4,868	907

See footnotes at end of table.

Digitized by Google

TABLE 90.—World[1] supply and demand crude petroleum and refined products, 1959[2]—Continued

(Thousands of barrels)

Country	Crude Petroleum					Refined Products			
	Production	Imports	Exports and reexports	Stock change, other demand, and loss	Total[3] refinery input / Total[4] refinery output	Imports	Exports and reexports	Domestic demand (including bunkers)[5]	Bunkers—all flags (as reported)
Africa—Continued									
Liberia						386		386	
Madagascar						986		986	
Morocco	712	r 515			1,227	4,285		r 5,733	
Nigeria	4,067		4,067			5,637		5,637	
Rhodesia and Nyasaland, Federation of						r 3,964		r 4,074	
Sudan						3,148		3,148	
Tanganyika						2,345	448	1,897	
Tunisia						3,241		r 3,399	
Uganda						r 1,184	183	1,001	
Union of South Africa		9,631		+55	9,576	19,429	3,002	26,003	
United Arab Republic (Egypt Region)	21,303	11,336	7,483	+56	r 25,100	7,466	1,474	31,092	2,302
Total	41,943	42,531	23,283	+3,978	59,966	82,370	21,473	119,507	
South Asia, Far East, and Oceania:									
Australia		73,545		−460	75,733	11,994	7,352	r 78,477	7,034
British Borneo	40,072		24,696		r 15,376	844	14,937	1,283	1,066
Burma	3,967			+444	3,523	r 594		4,117	
Ceylon						7,191	4	7,187	2,906
India	3,377	36,037		+2,338	r 37,076	13,482	2,067	48,491	r 2,380
Indonesia	139,088	r 11,435	61,661	+6,014	r 88,019	r 1,908	r 43,918	r 31,607	r 3,445
Japan	2,852	139,080		−1,236	143,168	23,061	2,681	163,548	
Korea, South						r 10,953		10,953	
Malaya and Singapore		2,139	1,910	+229		41,601	17,474	24,127	
Netherlands New Guinea	1,656		r 1,656					Insig.	
New Caledonia						377		377	

Digitized by Google

New Zealand						13,090		13,090	1,557
Pakistan	2,333			+51	2,282	7,924		10,206	
Philippines		8,662		−280	8,942	10,305		19,247	
Taiwan	13	7,235		+785	6,463	4,634	58	11,039	
Thailand						7,705		7,705	402
Vietnam, South (including Cambodia)						5,534		5,534	35
Total	193,308	278,133	89,923	+7,885	390,582	161,197	88,491	436,988	
World total, excluding Eastern Europe, U.S.S.R., and Communist China	6,074,523	2,351,498	2,309,176	+21,776	6,303,056	1,132,904	1,246,970	6,222,740	

[1] World totals exclude U.S.S.R., Communist China, and countries in Eastern Europe (except Yugoslavia).

[2] Bureau of Mines, Mineral Industry Surveys: WPS 142, July 25, 1960.

[3] Total input includes crude runs to stills plus runs of other unfinished oils, topped crude, and natural gas liquids blended.

[4] Total output includes refined-product output, plus refinery fuel and loss; excludes liquefied petroleum gases sold directly for fuel and chemical uses from natural-gasoline plants.

[5] Unless otherwise specified, data represent apparent domestic demand (including inland demand, refinery fuel and loss, and bunkers). Apparent domestic demand is derived from the components of refined product output, plus imports, minus exports, with no allowance for changes in stocks.

[6] Domestic demand as reported, including refinery fuel and loss, stock changes and bunkers; also includes, where available, liquefied petroleum gases sold directly for fuel and chemical uses from natural-gasoline plants.

[7] Estimate based on latest available data.

[8] Apparent domestic demand is heavily influenced by refinery fuel and losses, and bunker loadings.

Digitized by Google

OIL SHALE [7]

The world oil-shale picture improved in 1959.

Although the Union Oil Co. of California's development program was terminated and the pilot plant near Rifle, Colo., dismantled, the work of the Denver Research Institute, sponsored by The Shale Oil Co., Los Angeles, Calif., was pushed in a rebuilt pilot unit. A report on the findings has been scheduled for 1960. Considerable interest was shown in the Bureau of Mines-Atomic Energy Commission program of underground explosions.

Production of oil shale in France and Scotland continued to decline, but a shutdown in Scotland may be postponed by the building of a retort to process briquets made from fine shale that was formerly rejected and sent to the debris piles. After a century of continuous production, considerable material of this type has accumulated.

The U.S.S.R. continues to be the largest single producer of oil shale, much of which is consumed in the production of heating gas for Leningrad.[8]

A large-size retort has been designed for erection in Brazil. If it operates successfully it may be a prototype for a Brazilian oil-shale industry.

TABLE 91.—Production of oil shale, 1954–58, by countries [1]

(Long tons)

Country	1954	1955	1956	1957	1958
Great Britain	1,356,218	1,336,100	1,053,835	902,062	741,829
South Africa	257,407	274,459	256,942	(2)	145,486
Austria	1,038	841	707	694	320
France	243,976	214,000	144,000	40,538	2,500
Spain	234,071	486,669	589,348	728,231	760,925
Sweden	1,793,034	1,829,070	1,823,214	1,844,214	(2)

[1] Source: Statistical Summary of the Mineral Industry, published by Her Majesty's Stationary Office, London, 1958. Oil shale is also produced in Germany, Manchuria, and U.S.S.R.; U.S.S.R. mined 12,900,000 tons in 1957.
[2] Not reported.

NATIVE ASPHALT

Native Asphalt.—Producers of bituminous limestone reported sales of 1,509,277 short tons in 1959, an increase of 15 percent over 1958. The value increased from $3,218,000 in 1958 to $3,810,000 in 1959. Sales of bituminous sandstone decreased from 20,938 short tons in 1958 to 9,488 short tons in 1959, and their value dropped from $125,000 to $58,000 in 1959. The bituminous limestone was produced in Alabama, Oklahoma, and Texas, and the sandstone came from Missouri and Oklahoma.

Gilsonite production in 1959 amounted to 379,362 short tons valued at $9,400,000. All gilsonite was produced in Utah, and most of it was refined into petroleum products at a refinery in Colorado.

[7] Simon Klosky, Chemist, Division of Petroleum.
[8] Bulletin of the Institute for the Study of the USSR, vol. IV, No. 11, November 1957, p. 34.

Digitized by Google

TABLE 92.—Production and value of bituminous limestone, bituminous sandstone, and gilsonite, in the United States, 1949–59

Year	Bituminous limestone		Bituminous sandstone		Gilsonite	
	Production (short tons)	Value (thousands)	Production (short tons)	Value (thousands)	Production (short tons)	Value (thousands)
1959	1,509,277	$3,810	9,488	$58	379,362	$9,385
1958	1,305,555	3,218	20,938	125	317,280	4,864
1957	1,134,781	2,996	33,726	225	207,704	4,259
1956	1,358,669	3,223	99,864	891	89,003	3,822
1955	1,330,311	3,274	96,896	837	82,822	3,117
1954	1,191,793	2,782	146,029	905	75,943	2,724
1953	1,327,224	3,408	113,320	942	60,505	2,184
1952	1,428,562	3,560	142,136	1,127	60,740	1,780
1951	1,378,434	4,159	(1)	(1)	65,521	1,895
1950	1,184,676	3,522	(1)	(1)	66,186	1,774
1949	1,150,931	4,265	(1)	(1)	51,462	1,304

[1] Included with bituminous limestone.

569112—60——31

Digitized by Google

Digitized by Google

C. *Helium*

Helium

by Harold W. Lipper[1]

Contents

	Page		Page
General summary	471	Conservation	474
Production	471	Prices	474
Shipments	472	Foreign trade	475
Consumption and uses	472	Technology	475
Resources	473		

GENERAL SUMMARY

BUREAU OF MINES helium plants produced a record-breaking 477 million cubic feet of this essential element in 1959. The supply of helium was less than the demand before operations were resumed at the Navajo plant in July and begun at a new plant at Keyes, Okla., in August. Helium was in abundant supply after August, and the informal allocation system which had been in use intermittently since 1955 was discontinued.

Delivery of 26 new tank cars in August and September increased the total in the tank-car pool to 163.

Defense and space agencies and the Atomic Energy Commission continued to use more helium in their operations and research.

In July the Department of the Interior renewed its request for new legislation that would permit the first steps to be taken in a proposed program to conserve an estimated 52 billion cubic feet of helium, which otherwise would be wasted.

Unpublished research data relating to the extraction of helium from natural gas by low-temperature processes were placed on open file to provide otherwise unavailable information to those potentially interested in participation in the proposed conservation program.

PRODUCTION

Helium production for 1959 was 476,892,000 cubic feet, an increase of 43 percent over the previous record set in 1958. The Bureau of Mines helium plants at Amarillo and Exell, Tex., and Otis, Kans., were operated throughout the year. Operations were resumed at the Navajo plant, Shiprock, N. Mex., in July, when a supply of helium-bearing natural gas for processing became available from a

[1] Technical assistant.

Digitized by Google

private source. A new $12-million production plant at Keyes, Okla., was completed and began operating in August.

Trial operations at the new Keyes Plant began 9 months after award of the contract for its construction. Within a few days, high-purity helium was produced, and within 30 days the plant was in full-scale operation. Virtually all process engineering and part of the engineering design for the Keyes plant were done by the technical staff of the Bureau of Mines Amarillo Helium Activity. The basic process used is practically identical to that of previous plants but is improved significantly.

Total production in 1959 exceeded demand, but all needs were not met until additional production became available from the Navajo and Keyes plants. Beginning in September, helium was in abundant supply for the first time since 1954.

About 108 million cubic feet in excess of current requirements was stored underground in the Government-owned Cliffside field. This helium will be withdrawn later to augment supply during summer months when helium production is below average because of the normal decrease in supplies of helium-bearing natural gas for processing, or it can be used to meet unexpected increases. The volume stored underground is small compared with the monthly demand of about 40 million cubic feet.

TABLE 1.—Helium production in the United States, 1921–59

Year	Production (thousand cubic feet)	Year	Production (thousand cubic feet)
1921–28	[1] 5,761	1957	291,457
1929–42	[1] 11,776	1958	334,175
1943–49	[1] 83,545	1959	476,892
1950–54	[1] 137,957		
1955	220,711	Cumulative production, 1921–59	3,052,676
1956	243,880		

[1] Annual average.

SHIPMENTS

The Bureau of Mines shipped 375,408,000 cubic feet of helium in 1959, about 7 percent more than the peak set in 1958. Shipments to Federal agencies were 282,620,000 cubic feet and those to commercial (non-Federal) consumers were 92,788,000 cubic feet.

The five plants handled shipment of 1,258 tank cars, 745 semi-trailers, and 183,443 standard cylinders.

Delivery of 26 new tank cars in August and September increased the total in the tank-car pool to 163. Twenty of the new cars were for the Bureau of Mines and six for the Atomic Energy Commission. The Bureau of Mines owns 138 cars and the Atomic Energy Commission 25. All cars are used interchangeably for shipping helium, regardless of ownership, to provide efficient fleet operation.

CONSUMPTION AND USES

Federal agencies received about 75 percent of the shipments in 1959. Contractors for the Government used more than half of the helium

Digitized by Google

available for non-Federal consumption. Directly and indirectly, about 90 percent of the total helium consumption benefitted the Government.

In October, the informal allocation system was discontinued. The system had been used intermittently since 1955 to insure that helium for commercial distribution was used in the public interest. It was effective in assuring helium for defense, atomic energy, and medical use, and most research needs were met. Until the helium supply improved, obtaining helium for less essential purposes was difficult; some users were unable to get all they wanted because the demands of Federal agencies had to be supplied first. High Federal requirements necessitated allotment of the remaining helium to commercial helium distributors.

Defense and space agencies and the Atomic Energy Commission continued to use more helium in their operations and research. The low boiling point of helium makes it indispensable in low-temperature research. Its high thermal conductivity and chemical inertness are proving essential in many phases of gas chromatography. Both uses will become increasingly important in the next few years.

Some other applications of helium are in shielded-arc welding and leak detection, atomic-energy and guided-missile operations, and inflation of airships and meteorological balloons.

RESOURCES

Over 95 percent of the known helium-bearing natural gas resources in the United States are contained in four helium-bearing gasfields: (1) The Hugoton field of Kansas, Oklahoma, and Texas; (2) the Panhandle field of Texas; (3) the Greenwood field of Kansas; and (4) the Keyes field of Oklahoma.

The natural-gas deposits have been developed by private companies to supply gas for fuel markets and are being operated for that purpose. Helium is recovered at the Exell (Tex.) plant from gas produced in a small area of the Panhandle field. The new plant at Keyes, Okla., recovers helium from the Keyes field and is capable of recovering helium at maximum gas-withdrawal rates planned by the gas supplier. Helium recovery at the Otis (Kans.) plant is from several small, isolated, helium-bearing natural gasfields, where the helium resources are minor and in many respects marginal. Helium resources available to the Navajo plant, at Shiprock, N. Mex., are from a single well in an area where several high-pressure (3,000 p.s.i.), high helium content (5 to 8 percent) wells producing low B.t.u. gases have been discovered. Productive life of similar wells in the area has been notably short.

A source of helium-bearing natural gas, owned and developed by the Government, is the Cliffside field in the Texas Panhandle not far from Amarillo. The Bureau of Mines Amarillo plant extracts helium from the natural gas of this deposit. Resources of the Cliffside field are about 2 billion cubic feet of helium—important but small compared with the resources of major helium-bearing natural gasfields, which produce gas for fuel and from which the helium is not

Digitized by Google

extracted now. Annual loss of helium from such fields is more than 4 billion cubic feet a year.

Two relatively small helium-bearing natural gasfields have been discovered on lands of the public domain. These lands were withdrawn and established as Helium Reserve No. 1, Woodside structure, Utah, and Helium Reserve No. 2, Harley dome, Utah, in March 1924 and June 1933, respectively. Neither has been produced.

Prospects are not promising for discovery of additional deposits of helium-bearing natural gas in the United States comparable with those known and developed. Smaller fields have been found, such as the Pinta field in Apache County, Ariz., where the gas contains about 8 percent helium. The gas is not merchantable as fuel, and the field is not being produced. Recent discoveries of helium-bearing natural-gas deposits in Utah and Colorado offer promise of additional helium resources. Exploratory wells drilled by private companies in search of oil and fuel gas have discovered gas deposits containing appreciable quantities of helium. The full extent of the new fields has not been defined.

Although helium is found in gases from mineral springs, fumaroles, and volcanoes, is in the air in 1 part in 200,000, and can be formed by nuclear bombardment and fusion, none of these sources is economical for commercial production.

CONSERVATION

Bureau of Mines plants at Otis, Kans., Exell, Tex., and (beginning in August) the new plant at Keyes, Okla., produced helium from privately owned natural gas before the gas was transported to fuel markets. However, more than 10 times the produced volume of helium was withdrawn from other fields in natural gas that was not processed for helium. This helium was lost to the atmosphere without serving any useful purpose when the natural gas was consumed as fuel.

In July the Department of the Interior renewed its request for legislation that would enable it to carry out a long-range plan for conserving helium. A similar bill was recommended for enactment in August 1958, but Congress adjourned before it could be considered. Under the proposed legislation, private industry would be encouraged to participate in the program by financing, building, and operating up to 12 new plants. Plant locations would be on natural-gas pipelines where helium would be extracted from the natural gas before transmission to fuel markets. Helium thus recovered would be sold to the Government and stored underground in the Government-owned Cliffside field near Amarillo, Tex., until needed.

If enacted, the legislation would enable the first steps to be taken in a program to recover and conserve some 52 billion cubic feet of helium.

PRICES

The Helium Act of 1937 (50 Stat. 885; 50 U.S.C. 161, 163–166) provides that Federal agencies may requisition helium from the Bureau of Mines by paying proportionate shares of the expenses in-

Digitized by Google

cident to administration, operation, and maintenance of the Government helium plants and properties. Throughout 1959, the price to Federal agencies was $15.50 a thousand cubic feet.

The price of helium sold by the Bureau of Mines to commercial customers was $19 a thousand cubic feet. An additional charge of $2 a thousand cubic feet covered filling costs, when helium was required in standard-type cylinders. A list of charges and other information on the sale of helium by the Bureau of Mines is included in the "Code of Federal Regulations" (30 C.F.R. 1).

FOREIGN TRADE

Relatively small quantities of helium are exported annually under licenses approved by the Secretary of State.

TECHNOLOGY

Research was conducted at the Bureau of Mines Amarillo Helium Activity headquarters to improve efficiency and reduce costs of producing and transporting helium. Part of the research in 1959 was on phase relationships of helium-bearing natural gases. Results of this research and other data relating to extraction of helium from natural gas by low-temperature processes were placed on open file in May to provide information enabling private industry to determine the extent of their interest in participating in the proposed helium conservation program. In August, the open-file material was supplemented by an additional unpublished report, "An Experimental Study of the Phase Relationships of a Typical Helium Conservation Gas." Publication of the open-file material will be deferred until a well-rounded report can be assembled.

A chromatographic analyzer to analyze continuously for helium (tailings) in plant residue gas was built and successfully field tested. Development of the analyzer fills a long-standing need at the helium plants and provides an improved means for determining efficiency of helium extraction.

Work was completed on a helium purity tester to detect as little as one part per million total impurity. This work and continuation of experiments on container drying have great potential for maintaining 99.995+ percent helium purity from the plant to the consumer.

A continuous survey was conducted to determine potential new sources of helium-bearing natural gas from various places throughout the United States and, to a limited extent, from other countries. Analysis of the gas and the heating value calculated from the analysis (16 components in all) are furnished to the gas-well or pipeline owner in return for supplying the sample.

In 1959, 397 samples were analyzed without discovery of a new deposit of helium-bearing natural gas comparable with known deposits.

Digitized by Google

Digitized by Google

PART III. APPENDIX

Table of Measurement

Volumetric measures

	U.S. gallons	Imperial gallons	Cubic feet	Barrels	Cubic centimeters	Liters	Cubic meter
1 U.S. gallon [1]	1	0.83268	0.13368	0.02381	3,785.4	3.7853	0.0037854
1 imperial gallon [2]	1.201	1	.16054	.028594	4,546.04	4.5460	.004546
1 cubic foot	7.4805	6.22888	1	.17811	28,317.01	28.316	.028317
1 barrel [3]	42	34.972	5.6146	1	158,987.55	158.98	.15899
1 cubic centimeter	.00026417	.00021996	.000035314	.0000062895	1	.00099997	.000001
1 liter	.26418	.219976	.035316	.0062899	1,000.027	1	.001000027
1 cubic meter	264.17	219.97	35.314	6.2898	1,000,000	999.97	1

[1] U.S. gallon = the volume occupied by 231 cubic inches.
[2] 1 imperial gallont = he volume occupied by 10 pounds of water at 62° F. when weighed against brass in air at 30" barometric pressure.
[3] 1 barrel = 42 U.S. gallons.

Weight measures

	Pounds	Kilograms	Short or net tons	Metric tons	Long ton
1 pound	1	0.45359	0.0005	0.00045359	0.00044643
1 short or net hundredweight	100.0	45.359	.05	.04536	.04464
1 gross or long hundredweight	112.0	50.802	.056	.05080	.05
1 kilogram	2.2046	1	.0011023	.001	.0009842
1 short or net ton	2,000	907.185	1	.90718	.89286
1 metric ton	2,204.6	1,000	1.1023	1	.98421
1 long ton	2,240	1,016.06	1.12	1.01606	1

NOTE.—1 English water ton = the volume occupied by 1 long ton of water at 60° F.

Digitized by Google

Digitized by Google

Index

Page

Anthracite. *See* Pennsylvania anthracite.
Asphalt and related bitumens (native):
  Bituminous limestone 6, 437, 468
  Bituminous sandstone 6
  Gilsonite 6
Bituminous coal and lignite:
  As source of energy 2, 3, 122
  Auger 82–85
    Mining 82–84
    Sales 85
  Cleaning equipment, types 95
  Cleaning methods 95
    Mechanical. *See* Bituminous coal and lignite, mechanical cleaning.
    Pneumatic 95
  Competitive fuels 4
  Consumption 10, 11, 40, 118
    At coke ovens 119, 120
    At mines 105, 113, 115
    By consumer class 120
    By electric power utilities 120
      Fuel economy 121
  Deliveries, retail 120
  Disposition 56, 57
  Distribution 24–27
  Drying, thermal 102–104
  Employment 34, 37, 105
  Foreign trade 126
    Exports 126, 127
    Imports 126
  Fuel briquets 252
  Fuel efficiency 41
  Mechanical cleaning 40, 93–97
    By method of mining 96, 97
    Growth 94
  Mechanical crushing 97, 98
  Mechanical loading 85–92
  Mechanization 40, 85
  Packaged fuel 260
  Preparation, thermal drying 102–104
  Prices 13, 123
  Price indicators 18
  Production 1, 39, 41, 43, 45–55, 59–62, 105, 113, 130–132
    Auger mines 62, 82–84
      By thickness of seams 44, 45
      Per man-day 62, 67, 83, 84
      Value per ton 67, 123
    By days 51
    By districts 53, 57
    By months 49, 51–53
    By States, cumulative 55
    By States and counties 105, 113
    By weeks 49, 51, 54
    By years 55
    Growth 46, 47, 62, 70, 71
    Mined by continuous mining machines 65
    Percentage crushed 97, 98
    Strip mines 41, 47, 68, 74, 77, 78, 82
      By thickness of seams 44, 45
      Per man-day 62, 69
      Percentage 70
      Value per ton 70, 74, 123
    Underground mines 62, 63, 67
      By thickness of seams 44, 45
      Cut by hand 65
      Cut by machines 65
      Hand loaded 41, 85–91
      Machine cut 65
      Machine loaded 41, 85–91
      Per man-day 62, 67

Page

Bituminous coal and lignite—Continued
  Production—Continued
    Underground mines—Continued
      Shot from solid 65
      Value per ton 74, 123, 124
    Value 41, 46, 49, 56, 57
    Where shot holes are power drilled 66
    World 31, 32, 130
  Reserves 44
  Shipments 114, 118
    Railroads 114, 115, 118
    Trucks 114, 115, 118
    Waterways 114, 115, 118
  Stocks 41, 48, 122
  Strip mining 68, 82
    By States and counties 78, 82
  Technology 132, 133
  Thermal drying 102–104
  Treated to allay dust, percent 99–101
    Production 99, 101
  Underground mining 64
  Value per ton 123, 124
Bituminous coal and lignite dust, allaying, treatment 99, 101
Bituminous coal and lignite industry:
  Annual review 39
  Employment, trend 39, 47
  Salient statistics 41
Bituminous coal and lignite mines:
  Animal haulage 67
  Auger 82, 85
  Belt-conveyor haulage 68
  Capacity 39, 46, 49
  Cleaning plants, number 93
    Percentage of production 41, 93
  Coal crushing 97, 98
  Coal-cutting machines, number 65
  Conveyors, sales 92
  Days active 105, 113
  Disasters 33
  Employment 34, 39, 47, 61
    Daily 105, 113
  Fatalities 33, 34
  Haulage units, number 67, 68
    Types 67, 68
  Injuries 33, 34
  Loading units, mechanical, number 90
    Mobile, sales 92
  Locomotives, battery 67
    Other types 67
    Trolley 67
  Man-days worked 105, 113
  Men employed 105, 113
  Mine-days active 105, 113
  Miners, injuries, frequency rate 34
    Man-days worked 34, 56, 57, 105, 113
    Man-hours worked 34
    Number employed 34
    Number working daily 41, 56, 57, 105, 113
    Output per man-day 41, 47, 61, 105, 113
    Output per man-year 47
    Production per man-day 67, 105, 113
    Strip, man-days worked 78, 82
  Mining machines, continuous, sales 92
  Number 41, 44, 45, 56, 57, 59, 60
  Power drills, for shot holes, use 66
    Number 66
  Rope haulage 67
  Scrapers, sales 92
  Shuttle cars, sales 92

Digitized by Google

Page

Bituminous coal and lignite mines—Con.
Strip 68, 82
Bulldozers, number 72, 73
Carryalls, number 72, 73
Daily employment 78, 82
Draglines, number 72, 73
Equipment 72, 73
Growth 70, 71
Haulage 76, 77
Number 44, 45, 70–73, 75, 78, 82
Power drills 74, 75
Underground haulage units 67
Mechanical loading 85, 92
Equipment, sales 92
Production, per man-day 41, 56, 57, 68, 105, 113
Using mechanical loading devices, number 90
Bituminous coal and lignite seams, thickness 44, 45
Percentage of coal produced 44
Bituminous Coal Research, Inc 133
Carbon black:
Consumption and uses 288
Foreign trade 291
Exports 291, 292
Imports 291
General summary 283
Prices (carlots) 290
Production 284
Method and yield 285, 286
Number and capacity of plants 284, 288
Sales 289
Salient statistics 283
Scope of report 284
Shipments 287
Stocks 289
Value 289
World production 293
Carbon dioxide, natural 8
Coke and coal chemicals:
Ammonia:
NH_3 equivalent of all forms 233, 246
Sulfate equivalent of all forms 190, 233, 239
Yield per ton of coal 192, 239
Ammonia liquor (NH_3 content):
Production 233, 239, 246
Sales 233, 239, 246
Value 233, 239, 246
Stocks 233, 239
Ammonium (di- and mono-) phosphate:
Production 233
Sales 233
Value 233
Stocks 233
Ammonium sulfate:
Production 233, 239, 246
Sales 233, 239, 246
Value 233, 239, 246
Stocks 233, 239
Benzene (benzol):
Consumption 244
Production 233, 242, 243, 244
By grades 243
By States 242
Sales 233, 242
Value 233, 242
Stocks 233
Yield from crude light oil refined 241, 242
Breeze (coke screenings):
Consumption 191, 198, 199, 217
Production 191, 198, 246
Value 191, 198
Sales 191, 198, 199, 246
Value 191, 198, 246
Stocks 198, 218
Yield per ton of coal 191, 198
Chemical oil (tar-acid oil):
Production 233
Sales 233
Value 233
Stocks 233
Coal:
Anthracite:
Carbonized 190, 204, 206, 246
By months 204
Stocks 219
Value 190

Page

Coke and coal chemicals—Continued
Coal—Continued
Bituminous:
Carbonized 190, 192, 203, 206, 207
By months 203
By States 205
From captive mines 211
Preparation:
Blending 207
Washed and unwashed 206, 207
Source:
By States of origin 209, 210
By volatile content 208, 209
Destination (consuming States) 208, 210
Stocks, by months 219
Value 191, 204, 205
Average per ton at merchant plants 41
Coke industry:
Annual review 187
Days active 35
Employment 35
Injuries 35
Salient statistics 190
Scope of report 193
Statistical summary 190
Technology 220
World review 227
Coke, oven and beehive:
Consumption 10, 190, 191, 210, 212, 214, 215, 246
In iron blast furnaces 212
In principal anthracite markets 177
Per ton of pig iron 213
Distribution, by consuming States and uses 217
Foreign trade:
Exports 190, 212, 222
Imports 190, 212, 221
Prices 219, 220
Production 29, 190, 191, 194, 197, 212
By days 194
By merchant and furnace plants 191, 195, 196
By months 194, 195
By States 192, 193, 196, 197, 214, 216
Rate of production 203
World 228, 229
Sales 191, 215, 216, 246
Value 191, 215, 216, 246
Stocks 12, 190, 218
At merchant and furnace plants 218
By kinds 218
By months 218
By States 218
Yield per ton of coal 191, 192, 193, 213
Gas:
Production 190, 233, 235, 247
Used in heating ovens 235, 237
Disposal of surplus 192, 235, 236, 247
Distributed through city mains 233, 236, 247
For industrial purposes 233, 236, 247
In steel or allied plants 233, 236, 247
Under boilers 233, 236, 247
Value 192, 233, 235, 236, 247
Wasted 235
Yield per ton of coal 192, 235
Intermediate light oil:
Production 233
Sales 233
Value 233
Stocks 233
Light oil (crude):
Production 190, 233, 234, 241, 247
Refined on premises 241
Sales 233, 247
Value 233, 247
Stocks 233, 241
Yield per ton of coal 192, 241
Ovens:
Beehive 190, 201
Abandoned, by States 201
Average number active, by months 201
Number and capacity, by States 201
Rebuilt or repaired, by States 201
Slot type 190, 192, 200, 202
Abandoned, by States 200
Age 200
Annual coke capacity 190, 200, 202
At merchant and furnace plants 200, 202

Digitized by Google

Page

Coke and coal chemicals—Continued
Ovens—Continued
Slot type—Continued
New ovens completed, by States 200
In existence at end of year, by States 200, 201
Under construction at end of year, by States 200
Pitch of tar:
Production 233
Sales 233
Value 233
Stocks 233
Sodium phenolate (carbolate):
Production 233
Sales 233
Value 233
Stocks 233
Solvent naphtha:
Production 233, 242
By States 242
Sales 233, 242
Value 233, 242
Stocks 233
Yield from crude light oil refined 241, 242
Tar (crude):
Consumption 238
Burned as fuel 238
For other purposes 238
Refined or topped by producers 238
Production 190, 233, 238, 246
By States 238
Sales 192, 233, 238, 246
Value 192, 233, 238, 246
Stocks 233, 238
Yield per ton of coal 192, 238
Toluene (toluol):
Production 233, 242, 243
By grades 243
By States 242
Sales 233, 242
Value 233, 242
Stocks 233
Yield from crude light oil refined 241, 242
Xylene (xylol):
Production 233, 242
By States 242
Sales 233, 242
Value 233, 242
Stocks 233
Yield from crude light oil refined 241, 242
Crude petroleum and petroleum products:
Asphalt 437
Foreign trade 438
Exports 438
Imports 438
Natural asphalt and bitumens 468, 469
Sales 440–444
Salient statistics 438
Statistical summary 437
Aviation gasoline 401–403
Coke 445, 447
Crude oil 372
Consumption and distribution 372
Daily average demand 378, 379
Employment and injury experience 14
Imports 450–453
Income and wages 15, 16
Production 352–356
Districts 374
United States 352–356
World 463–467
Receipts at refineries 373–377
Reserves in the United States 347, 348
Runs to stills 370, 371, 376, 377
Salient statistics 339, 344
Stocks 382–386
Supply and demand 340–342, 348–351
Value and price 387, 388
Wells 366
Drilled 367, 368
Producing 369
Distillate fuel oil 343, 423
Sales 425, 426
Salient statistics 424
Prices 427

Page

Crude petroleum and petroleum products—Con.
Gasoline 339, 404
Consumption 408, 409
Prices (average monthly) 418
Production 406, 407, 409
Salient statistics 405
Stocks 415–417
Supply (days) 418
General summary 337, 338
Jet fuel 435
Salient statistics 436
Kerosine 343, 419
Sales 421
Salient statistics 420
Prices (average) 422
Liquefied gases 437
Lubricants 432
Salient statistics 433
Prices (average at refinery) 434
Miscellaneous oils 447
Oil shale 468
Petroleum coke 445, 447
Refined petroleum products 388
Demand by products 389
Foreign trade 450
Exports 450, 454–459
Imports 343, 450–453
General review 388–390
Intercoastal shipments 448
Percentage yields 393
Pipeline transportation 412, 413
Prices 396
Refinery capacity 401
Refinery districts 347
Refinery input and output 392, 397–400
Salient statistics 390, 391
Shipments to U.S. Territories 345
Stocks 394, 395
Supply and demand of all oils 388
Residual fuel oil 339, 428
Prices (average) 432
Sales 430, 431
Salient statistics 429
Road oil 437
Sales 443, 444
Salient statistics 438
Statistical summary 437
Scope of report 345
Still gas 447, 448
Transportation 376, 411–413
Unfinished oils 448
Wax 445
Prices (average refinery) 446
Salient statistics 445, 446
Fuel briquets and packaged fuel:
Fuel briquets:
Annual review 28, 29
Binders 254, 255
Capacity 252
Consumption 251
Foreign trade 257
Exports 258
Imports 257
Production 252, 254
By months 253
By regions 253
Value 253
World 263, 264
Raw fuels 253, 254
Sales 257
Value 257
Salient statistics 250
Scope of report 250, 251
Shipments 255–257
Destination 256
Methods of transportation 257
Technology 258–260
World review 28, 263, 264
Packaged fuel:
Annual review 28, 29
Binders 262
Capacity 260
Production 260, 261
By months 261
By States 261
Value 261
World 263, 264

Digitized by Google

Page

Fuel briquets and packaged fuel—Continued
Packaged fuel—Continued
Raw fuels 261
Sales 263
Value 263
Salient statistics 250
Scope of report 250, 251
Shipments 262, 263
Destination 262
Methods of transportation 263
World review 263, 264
Helium:
Conservation 474
Consumption and uses 472
Foreign trade 475
General summary 471
Prices 474
Production 471
Resources 473
Shipments 472
Technology 475
Lignite. *See also* Bituminous coal.
Natural gas:
Consumption 245, 302, 306–308, 312
By countries 314
By States 308, 309
Industrial 310, 311
Residential and commercial 308, 309
Used with manufactured gas 312
Development and production by States 6, 300, 317
Employment and injury experience 36
Exports 295, 302
Gas wells, by States 301
General summary 295
Gross withdrawal and disposition 296, 298
Imports 295, 302
Interstate shipments, imports and exports 302–305
Marketed production 295, 300, 303, 314
Pipelines 307
Regional production and consumption 302
Reserves 296, 297
Salient statistics 295
Scope of report 296
Treated at natural-gasoline and cycle plants 312
Underground storage 296, 300, 301
Value and price 295, 312, 313
World production 313
Natural gas liquids:
Butane 325–327, 330, 331
Butane-propane mixture 325, 326, 330
Condensate 316
Ethane 325–327, 329–331
Foreign trade 334
Exports 334
Gasoline 329, 332, 335
General summary 315
Isobutane 325, 327, 330, 331
Isopentane 322
Liquefied petroleum gases 315, 325–331
Sales 326–332
Liquefied refinery gases 326
Production 326
Naphtha 322
Other LP-gas mixtures 325, 326, 330, 331
Percentage in refinery gasoline 325
Prices (average) 333
Production 317, 320, 321
Propane 325–327, 330, 331
Reserves 317, 318
Salient statistics 316
Scope of report 315
Shipments 321
Stocks 332
Supply and distribution 322, 323
Yield, processes, and number of plants 319
Packaged fuel. *See* Fuel briquets and packaged fuel.
Peat:
Annual review 28, 29
Characteristics 266
Consumption 271, 272
Government regulations 266
Imports 275, 276, 277, 279
Duty 276

Page

Peat—Continued
Injuries 37
Production 6, 269–271
By kinds 271
By States 271
Value 6, 271
World 29, 279–281
Reserves 268, 269
Sales 272–275
Value 272–275
Salient statistics 266
Scope of report 266, 267
Technology 276, 278, 279
Uses 271, 272
World review 28, 279, 280
Pennsylvania anthracite:
Annual review 135
Competitive fuels 136, 143, 177
Consumption 8, 10, 135, 140, 175, 176
At cement mills 176
At collieries 137, 175, 176
At oven-coke plants 138, 175, 176, 191, 204, 206, 207
At electric-utility plants 138, 176
By railroads 138, 176
In manufacturing briquets 176, 253, 254
In pelletizing and sintering 176
Local 137, 144, 146, 151–153, 173, 174
Days worked, average 136, 137, 140, 168, 169
Distribution 138, 169
By rail 138, 173
By truck 138, 173, 174
Coal year 169, 170
Earnings 15, 138
Employment 12–14, 136, 168
Energy 2–4, 40
Equipment 143, 160, 161
Cutting machines 160
Stripping 160, 161
Underground mechanical loading 159, 160
Foreign trade 178
Exports 28, 136–138, 140, 169, 170, 172, 173, 178–180
Imports 28, 137, 138, 140, 180
Hours worked 15, 138
Income originated 20
Injuries 33–35, 136, 137
Mine-water control 32
Mining methods 143
By undercutting machines 137, 140, 160
Culm-bank recovery 155
Dredge 157
Strip 155
Underground 154
Loading, hand 153, 161
Mechanical 137, 140, 153, 159–161
Preparation 142
Output, per man-day 13, 137, 140, 168, 169
Per man-year 137, 140
Prices 169
Retail 164
Wholesale 138
Quoted 163
Production 6, 137, 138, 140, 143, 151–153
Breaker and washery 151, 152
By counties 153
By dredge 151–153, 157
By fields 151, 153
By months 138, 158
By regions 152, 153
By weeks 158
Culmbank 153, 155, 156
Strip 153, 155, 156, 161
Underground 153, 154, 161
Values 137, 140, 152, 153
Average 140, 167
By sizes 144, 146, 165–167
By sizes 144, 146
Washery. *See* Breaker and washery.
World 181
Receipts:
Lake dock 137, 138, 174
New England 137, 138, 175
Research 181
Reserves 42
Sales realization 18, 135, 137, 162, 165–167

Digitized by Google

	Page
Pennsylvania anthracite—Continued	
Shipments	137, 138, 144, 146, 173, 174
By rail	138, 173
By percent of size	149–151
By truck	138, 173, 174
By size	144, 146
Local	137, 144, 146, 152, 153, 173, 174
Stocks	12, 137, 138, 177, 178, 219
Value	8, 137, 140, 152, 153
Average	135, 140, 162, 167
By sizes	144, 146
By sizes	145, 147, 165–167
Technology	181
Mining	181
Mine-water control	183
Preparation	184
Pennsylvania anthracite—Continued	
Technology—Continued	
Utilization	185
World production	29, 181
Review of the mineral-fuel industries:	
Consumption	10
Distribution of bituminous coal and lignite	24
Domestic production	1
General summary	1
Government activities	32
Income and investment	20
Labor and productivity	11
Prices and costs	13
Stocks	11
Transportation	22
World review	28

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

UNIVERSITY OF MICHIGAN
3 9015 03888 3792

DATE DUE

Digitized by Google